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WRITTEN SO YOU CAN UNDERSTAND IT

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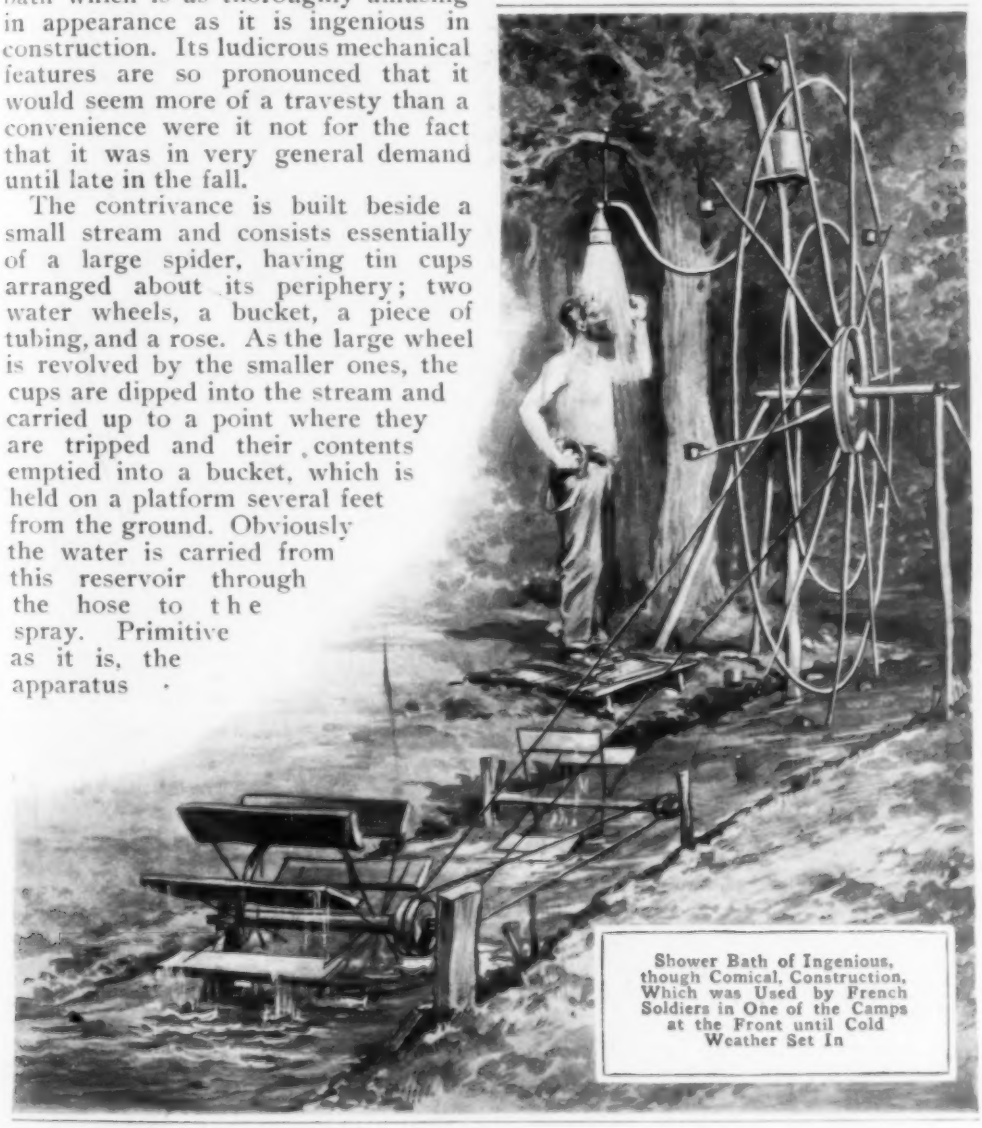
Crude Shower Bath Real Luxury for Soldiers

IN one of the French army camps the soldiers have improvised a shower bath which is as thoroughly amusing in appearance as it is ingenious in construction. Its ludicrous mechanical features are so pronounced that it would seem more of a travesty than a convenience were it not for the fact that it was in very general demand until late in the fall.

The contrivance is built beside a small stream and consists essentially of a large spider, having tin cups arranged about its periphery; two water wheels, a bucket, a piece of tubing, and a rose. As the large wheel is revolved by the smaller ones, the cups are dipped into the stream and carried up to a point where they are tripped and their contents emptied into a bucket, which is held on a platform several feet from the ground. Obviously the water is carried from this reservoir through the hose to the spray. Primitive as it is, the apparatus works and provides the men with a much-needed facility for bathing.



Shower Bath of Ingenious, though Comical, Construction, Which was Used by French Soldiers in One of the Camps at the Front until Cold Weather Set In

A COMBINATION SWITCH FOR DOORBELL AND HALL LAMP

A Canadian inventor offers a new solution for the exasperating trouble attendant on coming home to a darkened hallway at night. His idea embodies a switch to be operated in connection with a doorbell push button, causing a hall light to be turned on at the same time the doorbell is rung. The push button has an extension in the shape of a rod which runs to a switch for operating the light. Pushing the button rings the doorbell in the usual manner, and also closes the light switch through the medium of the rod. When pressure on the push button is released, a spring within the button causes the rod to return to its former position, opening the bell circuit, but leaving the light burning. The light may be turned on or off at any time by means of two other push buttons which work directly on the light switch itself.

The Outer Switch Operates the Doorbell; the Inner, the Hall Lamp

¶A general revival of freight traffic, unequaled since 1907, is reported by railways centering in New York City.

SOUNDING MACHINE WORKED BY STEAM ENGINE

A great increase in speed in making soundings has been brought about on the steamer "McArthur" and the launch "Delta," both of the Coast and Geodetic Survey, by the installation of a steam engine for operating the sounding machine. Some idea of the speed of handling is given in the fact that with this equipment a sounding to a depth of 900 ft. can be made in two minutes, while the engine reels in the wire at the rate of 720 ft. a minute. The wire is paid out over an arm that swings upward when the lead strikes bottom and takes up the slack until the brakes are applied. The "McArthur" can easily go ahead with 600 ft. of wire out, and in sounding at a depth as great as 780 ft. it is possible to go ahead immediately after the sounding is read and have the lead up and ready before the stop is made for the next sounding.

CARBONIC ACID EMPLOYED IN TREATING WOUNDS

Military surgeons with the German army are taking advantage of the pain-stilling and disinfecting properties of carbonic acid in the treatment of wounds by utilizing an effervescent powder which is now being prepared. This is composed of 10 parts sodium bicarbonate, 9 parts tartaric acid, and 19 parts sugar. The ingredients are thoroughly mixed and then crushed to about the fineness of granulated sugar. The substance is applied freely to the surface of a wound, the moisture of which causes it to effervesce and liberate carbonic acid.

NEW AMERICAN FIGHTER GIVEN WORKOUT

THE dreadnaught "Nevada" and its sister ship "Oklahoma" embody the "everything or nothing" idea of protection. The "Nevada," shown here with Manhattan bridge in the background, is passing down East River from the Navy Yard. During one of its standardization tests recently the vessel made a speed of 24.22 miles an hour. It mounts ten 14-in. guns and is provided with four submerged 21-in. torpedo tubes.

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ELECTRIC STOVE IS BUILT IN KITCHEN WALL

To minimize the amount of space ordinarily occupied by a cooking range, a Montana inventor has designed a compact, built-in electric stove for the kitchen wall. It may be constructed in various sizes to meet the needs of different families, and offers especial convenience for those who reside in cramped city flats. The oven is set flush with the wall and immediately above a shelf on which hot plates are mounted. It is insulated on five sides by a 4-in. thickness of mineral wool and asbestos. In addition to a manual switch, the oven current is controlled by both a clock switch and thermostat, so that the heat may be shut off automatically at a predetermined time or when a prescribed temperature is reached. The whole contrivance occupies no more room than a short pantry shelf. The number of hot plates used may be varied according to the needs of the individual. Application for patent rights has been made by the inventor.

Compact Electric Stove and Oven Built in Kitchen Wall

GERMANS INSTITUTE REFORM IN MILITARY ATTIRE

Through an imperial decree recently issued, a long advocated reform in the dress of the German soldier has been effected. General uniformity in color and design and the elimination of distinctive apparel for officers are the salient features of the new regulations. The introduction of the change at this time is due to the fact that the previous stock of cloth and personal equipment has been completely used up during the present war. All military uniforms, it is understood, with the exception of those of the jaeger regiments, will be made of field-gray. The sharpshooters, or jaegers, will be clothed in green-gray. One cut of gray trousers and one style of black boots will be worn in every branch of the army. An officer will be scarcely distinguishable from a private. Regimental distinctions will be shown only by decorations and the facings of the uniforms, which will be of a quiet color. All trappings and harness are to be black, and haversacks gray. In time of peace it is possible that a finer cloth will be used in the officers' uniforms than in those of privates, but the color and general appearance will be the same in each instance.

LOUD-SPEAKING TELEPHONE FOR WINDOW DEMONSTRATOR

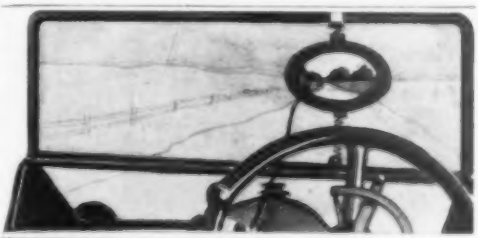
By adapting it to meet the needs of window demonstrators, who advertise special commodities on sale at retail stores, a new and rather practical use is being made of the loud-speaking telephone. A pair of megaphones is mounted on the outside of a building at a convenient height and provided with

With the Telephone Apparatus Installed in a Show Window, a Demonstrator can Hold an Audience and Interest It Much Easier than When Depending upon Pantomime

receivers which are connected with a transmitter. With this facility a demonstrator is enabled to make his discourse clearly understood by an audience on the sidewalk in front of him, instead of having to depend upon pantomime, or printed cards, to convey his message. In addition to the opportunity it affords for putting across snappy, business-getting talks, the use of the equipment in this capacity acts as an added attraction, as its novelty serves to draw the attention of passers-by to a window.

AUTO WINDSHIELDS ARE CLEANED ELECTRICALLY

A means has been devised whereby automobile windshields may be kept clear of frost and snow by electricity. A coil of wire, oval in shape and perhaps six or eight inches in longest inside dimension, is clamped against the glass of the windshield by means of springs attached to the frame. Current from a storage battery is sent through the coil, the latter having enough resistance to produce considerable heat. This heat is said to be sufficient to melt frost and snow from the shield, at all times permitting the chauffeur a clear view ahead under the most adverse conditions.



Heat from the Coil Clamped on the Windshield Keeps Glass from Freezing Over in Winter

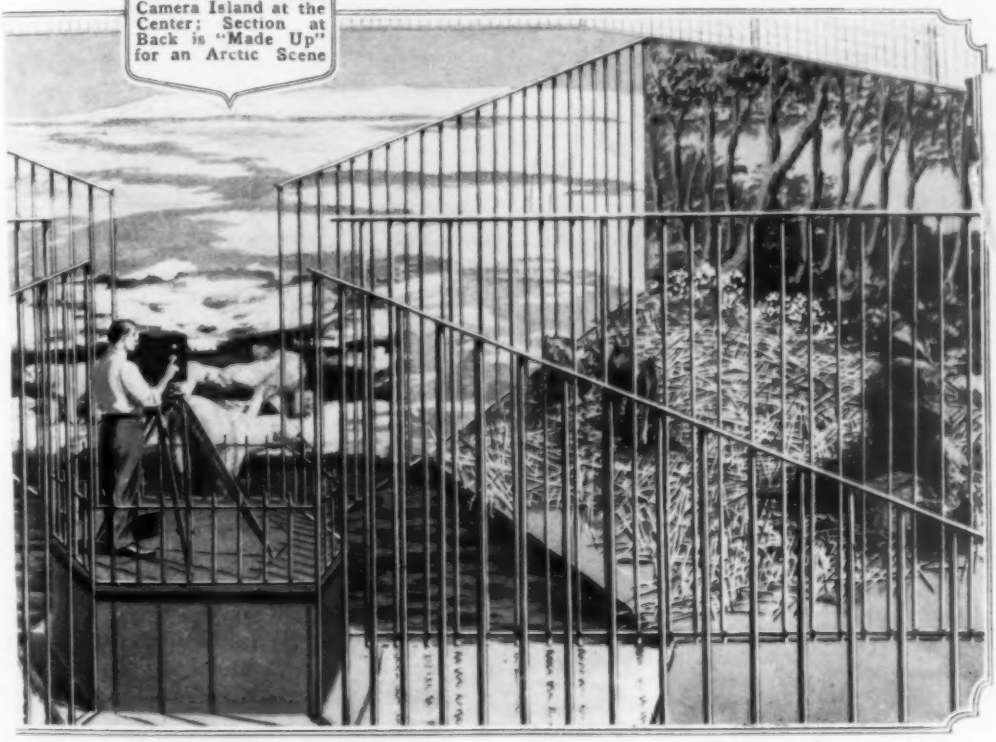
MAKING A JUNGLE THRILLER FOR THE MOVIES

AN idea of the danger that motion-picture players are sometimes required to face in staging scenes in which wild animals take part, as well as of the careful and tedious process followed, is given in the work of producing an act in one of the serial thrillers now popular with the movie-going public. On the screen the act is shown as a continuous series of rapidly moving pictures. In the studio the whole matter has a very different look. At the start, a woman, dressed in the costume of a circus performer, is seen standing in a small inclosed "jungle" waiting for a crouching lion to spring. At a sharp command the motion-picture camera begins to click, and a few minutes later when the command "cut" is given, the camera is stopped instantly. Then, while the camera man waits, the costume of the "circus woman" is hurriedly transferred to a man of powerful build who is able to stand the weight of the springing animal, and the camera is again set going. As the man goes down under the weight of the powerful beast the camera is again stopped, and, while the lion is held over the prostrate man, the assistants tear open his shirt, paint blood stains on his back, and whip the animal into a snarling attitude over his neck just as the camera starts the third time. Next, a circus clown steps into the range of the camera, approaches the "dead woman" and grasps a jewel that hangs from her neck.

Although there was a big element of real danger in this incident, the position of the actor was at no time so perilous as it might seem. The lion had been subjected to a long series of rehearsals for this particular act, and was watched and controlled by trainers every second to prevent his making a real attack. The whip of a trainer, who stood just outside the picture, or concealed behind some of the imitation underbrush, was constantly snapping at the animal's back, while on the opposite side of the arena stood another trainer with a loaded gun ready for instant use in case of a real attack. The man with the gun needed the utmost coolness and judgment, for the lion used in the act is valued at $16,000, and a shot, except in case of necessity, would have been a costly and disastrous mistake. In spite of all the precautions that it was possible to take, it undoubtedly required the highest class of nerve for the man to lie still under the savage beast while its jaws hung menacingly only a few inches from his neck.

The "jungle arena" in which this act was produced is part of a Los Angeles establishment, recently placed in service and said to be the largest and best arranged in the country. The arena is a six-sided inclosure, about 140 feet wide between parallel sides, and in it all the wild-animal acts are staged. It is divided into six triangular sections

Typical Scene in a Los Angeles Movie "Jungle." The Picture Below Shows How the Arena is Divided into Sections with the Camera Island at the Center; Section at Back is "Made Up" for an Arctic Scene



by iron fences running from the center to the junctions of the sides, while at the center is the camera island, a concrete platform inclosed by an iron fence. Each of these triangular sections constitutes a separate "jungle," so that it is possible to have six acts going on at one time. Encircling the camera island is a moat, 6 ft. wide and 4 ft. deep, which is kept filled with water as a protection for the camera man and director as well as a means

of escape for the players in case of necessity. The dividing fence extends only a few inches below the surface of the water in the moat, so that all a performer has to do to escape a threatened attack is to dive into the water and come out in the adjoining section of the arena.

These "jungles" are in many ways as artificial as the setting of a theater stage, about the only real objects being the dead trees scattered about the inclosures. The wooden exterior walls carry painted landscapes. Sand and straw make the ground of the forest, while even the boulders on which the animals crouch are artificial, being made of wood and wire, well plastered with brown clay. In spite of the facts that the jungle is "made up," and that it is inclosed by fences over which spectators watch the proceedings, the finished picture is as realistic as the real thing. Not only the jungle, but arctic scenes as well, are regularly staged in this arena, a liberal application of white paint being sufficient to give a perfect illusion of snow and ice.

CHAMPAGNE BOTTLE THROWS HIDDEN CONFETTI

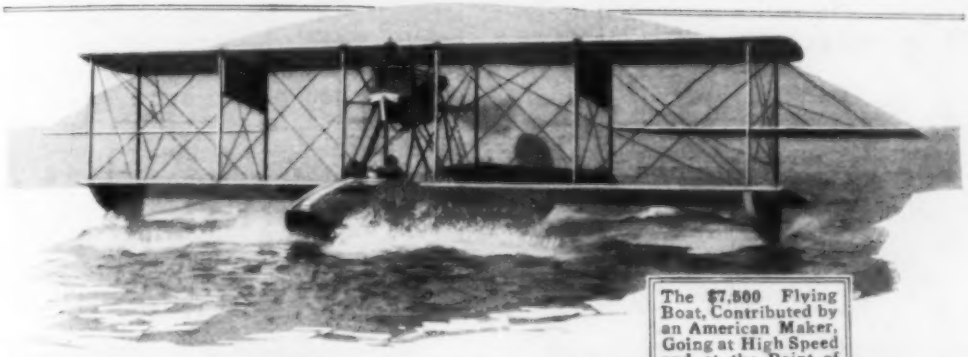
Americans, when in the mood for throwing confetti, or rice, or old shoes, generally do it by the sackful. A French dealer has figured out what he evidently considers a more refined way. Just beneath the stopper on an imitation champagne bottle he places a charge of confetti in a capsule. Upon opening the bottle a spring mechanism shoots the confetti out into the faces of the would-be imbibers of spirits. The innocent appearance of the bottle, together with its possibilities as a present for newly wedded couples, or New Year's celebrators, or the like, has made it a novelty of some attraction among practical-joke enthusiasts.

Innocent-Appearing Champagne Bottle Discharges Confetti upon Opening

GOOSELIKE MONITORS PROOF AGAINST TORPEDOES

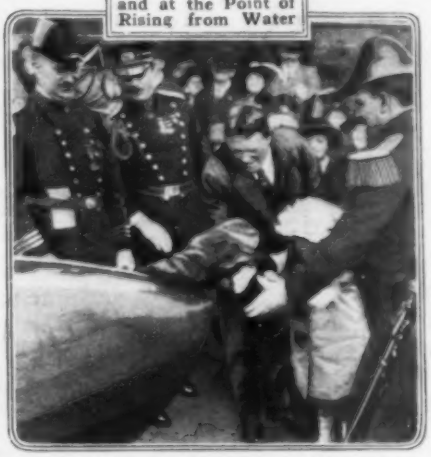
Monitors of a very queer sort were introduced not long ago at the Dardanelles by the allies. Amusing descriptions of these craft have been printed in London, but in spite of their ludicrous appearance it seems that they are real factors. Some time ago when one of the boats first put in at Kephalos Harbor in the Ægean it caused consternation. Instead of steaming in like an ordinary war vessel, it seemed to waddle through the water like a huge goose, and from a distance looked as if it were showing its bow to the stern. A large turret is carried on a high, flat deck. This mounts two 14-in. rifles. Just below the surface of the water the sides of the monitor bulge out about 10 ft. and then curve down. This peculiar hull construction accounts for the clumsy movements of the vessel, but it is said to make it proof against torpedoes. The ship is large and roomy. The only armament it carries in addition to the heavy guns are aerial rifles.

ORGANIZATION OF NEW YORK "AEROPLANE MILITIA"



The $7,500 Flying Boat, Contributed by an American Maker, Going at High Speed and at the Point of Rising from Water

The Flying Boat Ready for the Christening, with Naval Officer Who will Instruct the Flying Corps



The Christening Ceremony: One of the Impressive Features of the Organization of the "Aeroplane Militia"

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A beginning was made in the development of an element of vital importance in national defense when, on Nov. 1, 1915, the flying corps of the New York naval militia was organized. The important feature of this organization is that it is a part of the national guard and is composed of civilians who have volunteered to undergo the training that will fit them for service as airmen in case of war, and it is believed the idea is one that will be adopted in other states. The corps is to be instructed by officers of the United States Navy. When the organization of the corps was first proposed, Glenn H. Curtiss, a maker of aeroplanes, offered to contribute a flying boat of the most up-to-date type, estimated to cost about $7,500, as announced in this magazine at the time the offer was made. One of the features of the impressive ceremonies accompanying the organization of the corps was the christening of this craft, which was conducted after the manner of the christening of a naval vessel.

MOTOR FOR MAKING BICYCLE INTO MOTORCYCLE

A complete gasoline motor so small and light that it can easily be held in the hands has been designed for making a bicycle into a motorcycle at the will of the owner. The motor fits within the frame of any diamond-frame bicycle, and the power is applied

through a hoop-shaped belt pulley that is attached to the spokes of the rear wheel. The entire equipment weighs 21 lb., but provides power for driving

This Motor can be Fitted to Any Diamond-Shaped Bicycle Frame; Power is Transmitted through a Hoop-Shaped Belt Pulley Attached to the Spokes of the Rear Wheel

the bicycle at a speed of 25 miles an hour on level roads. A gasoline tank having a capacity of ¾ gal. forms part of the equipment, and it is claimed that this supply is sufficient for carrying the rider a distance of from 60 to 70 miles. The principal advantage claimed for the motor in addition to its low cost is that it provides a light, clean, and durable motorcycle that is more easily handled and is less expensive to operate than the average ready-built machine.

PART-TIME SCHOOL STARTED BY COMPANY FOR BOYS

In the offices of a Chicago company where more than a hundred boys are employed, a very interesting educational experiment is being conducted. Three days each week between noon and two o'clock every boy attends school. This represents an instance of a large business organization attempting to overcome the detrimental effects of blind-alley jobs and to enable half-schooled youngsters to improve their status while employed. The man responsible for the execution of the plan asserts that the company has always found the disposition of old office boys a difficult problem. In the majority of instances they are entirely unfitted to hold clerical or other positions of responsibility when the time comes that they are too old to serve longer as office attendants. By giving them the advantages of a part-time school it is hoped that they will be able to develop sufficiently to hold better places with the company instead of eventually being discharged. When the plan was suggested to the boys they all gave it hearty support and enrolled.

AN ARTISTIC TELEPHONE COVER

One of the latest and most attractive of telephone covers consists of a shell made in the form of a globe around the lower part of which, as if furnishing support, is arranged a number of delicately modeled figures. On the globe the surface of the earth is shown in relief. The shell is made of wood fiber and is strong but light. It consists of two pieces which are hinged together at the back, and is of such size that when closed it entirely conceals the telephone. The cover is finished either in ivory or old gold.

This Telephone Cover Consists of a Hinged Shell Made of Wood Fiber

GAMES FOR THE BLIND WHICH MAY BE PLAYED ANYWHERE

By HAROLD MOLTER

Principal of Boys' Department, Perkins Institute for the Blind

AT a recent exhibition of the activities of blind children, the visitors were very much interested in the amusements of the boys and girls. A gymnastic exhibition in a school for blind children differs very little from one given at a gymnasium for seeing children, for it includes calisthenics, marching, apparatus work, and pyramid building. The boys play "hockey" with a tin can, on a cement floor, and "football" with the assistance of sighted players. The girls dance and play ring games with pleasure and ease, so that to a visitor there would seem to be little difference between the amusements of a blind and a seeing person. In running, wires are often used as guides, and for some games, bells are placed inside of footballs and baseballs.

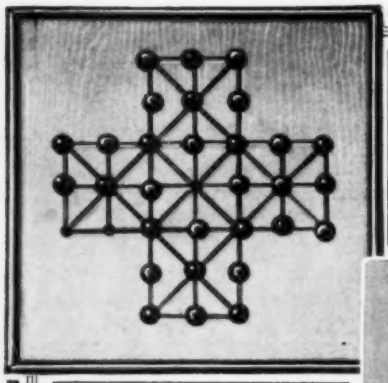
When we examine the quiet games, we find that certain devices are usually necessary to enable the blind player to play the games of his sighted associates. The Germans have proven themselves the most active and versatile in preparing games for the blind, and it is interesting to note in this time of war, that their game of "siege" is characteristic of how these people train their children, in times of peace and play, to think about military strategy. A number of games here pictured have been imported from Germany. Any amateur mechanic can make all of them, and as the apparatus is light and easily handled, the games may be played anywhere—in the home having one or more blind members; on a park bench where blind friends are wont to meet on sunny days; or in factories or offices during lunch hours.

In general, wood is the most convenient material to use. Lines may be represented by little tacks, raised strips of wood or cardboard, or grooves. The grooves are the least desirable, for, to the fingers of a blind person, a raised line is easier to follow than a groove. In the case of checkers and similar games, the little disks, or indicators, should have small projections underneath, which will fit into holes drilled in the proper places in the board, as in the mill game. In others, the board consists of little pockets formed by thin strips, as in halma. Sometimes it is possible to use thick cardboard in place of wood, for the playing board. This should be varnished or shellacked after the cardboard has been put into proper form.

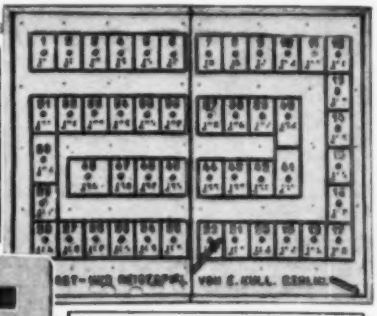
Any game of cards may be adapted by using the raised dots which represent letters. These dots are punched by means of a sharp-pointed instrument called a stylus, which resembles an awl. The raised part of the dots should be on the face of the card. Blind people enjoy using cards with pictures, and for that reason the game of "baseball" is very popular. Plain cards are often used, however.

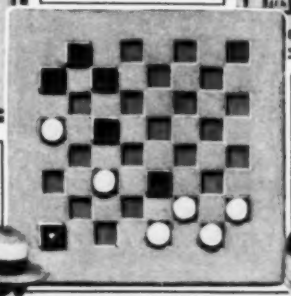
The solitaire games are interesting to those who have much time to themselves. The "pyramid" game consists of eight wooden disks, each smaller than the next one below it. These are moved to any one of the rods, one at a time, and always so that there is a smaller above a larger. The puzzle is solved when the whole pyramid has been transferred in its original form to either one of the rods which were unoccupied at the beginning.

The "fox and geese" game is often played with marbles. There is one unoccupied spot in the beginning and the play is as follows: One indicator (a marble or rod) jumps over another adjacent to it, and to the next space beyond, which of course must be vacant. In the beginning the center space is the only unoccupied spot. The indicator which has been jumped is removed. This operation of jumping and removing is continued until only one indicator is left at the center.



Below: Two Shapes of Checkermen, Resting in Depressions in the Board, are Used by Blind Opponents. Each Checker Has a Little Center Countersunk on One Side. When This Side is Turned Up, It Represents a King





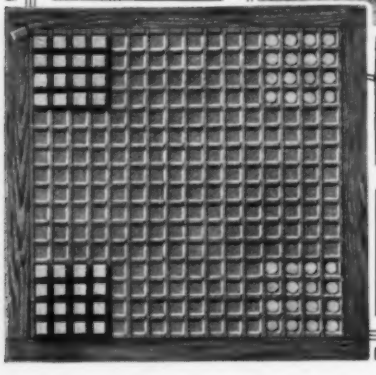
Board for Playing "Fox and Geese": By a Process of Jumping, One Man should be Left in the Center at the End of the Game. Marbles are Used for Men

Exciting Events Occur on This Journey. The Travel Game Comes from Germany. Dice are Thrown to Determine the Route of the Traveler, While Pins Indicate His Location

Blind Men Enjoying a Quiet Game of Checkers on Roof Garden for Jewish Blind, East Side, New York City

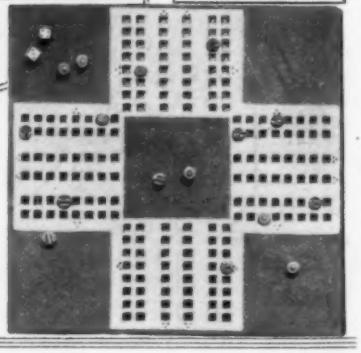
Lotto with Beads or Beans for Covers, and Holes in the Cardboard Number Sheets. The Figures are Raised and Dotted Characters are Used. This Old Game Is Very Popular with the Blind

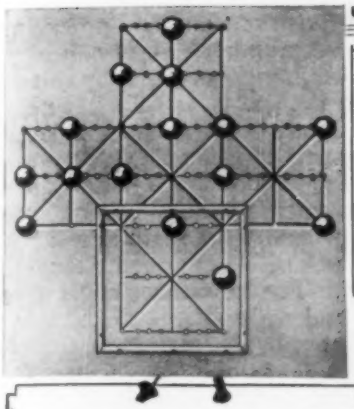
Above: Interlocking Dominoes are Cut from Compact Paper. Little Tacks are Used as Dots.
Left: Archball. The First Girl in Each Line Claps Her Hands or Calls to the Girl Who Has the Ball



Left: Halma. The Wooden Indicators are Cut into Different Shapes at the Top for the Different Players

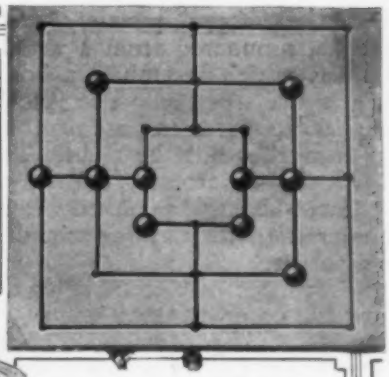
Right: Cardboard of a Very Durable Sort is Shellacked and Makes a Splendid Pachisi Board



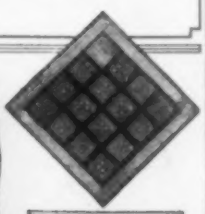


"Siege"—a Good Preparation for Chess: The Besieged Holds the Fort with Two Men. The Besieger Tries to Take the Fort

The Two Pictures Immediately Below Show Playing Cards for the Blind, Having Raised Dots to Represent Letters, and Two Blind Persons Deeply Engrossed in a Game

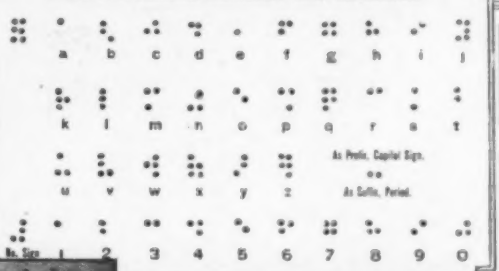


"Mill"—a Lively Game Originated in Germany: Three Men in Line Make a Mill, Causing the Opponent to Lose a Man



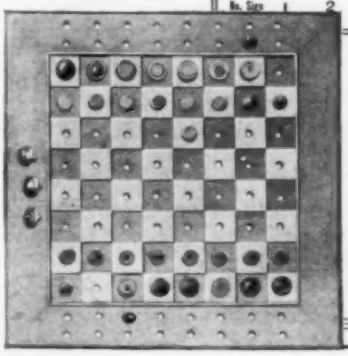
A German Game of Authors: These Carry the Information in Braille, but Blind People Like Pictures on the Cards as Well

AMERICAN BRAILLE ALPHABET AND NUMERALS



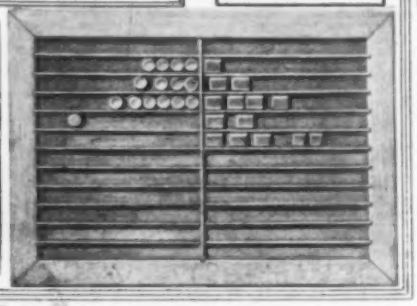
"Fifteen"—a Game of Solitaire, and the "Pyramid," Always a Smaller Above a Larger

The Braille System of Reading for the Blind Consists of Combinations of Six or Less Dots in Different Positions



Left: A German Chess Board. The Light Squares are Raised, the Darker Squares are Lowered

Right: An Ingenious Arrangement of the Old Game of Backgammon: The Cross Pieces Are Thin Strips of Wood



In the "fifteen" puzzle, there are 15 blocks, numbered from 1 to 15. The holder, which resembles a box cover, has space for 16. The blocks are shaken up and then put into the holder in any order but the right. They are then moved around, one at a time, without being removed from the holder until they are arranged in regular order.

It will not be necessary to describe how the other common games, such as dominoes, checkers, and chess, are played, but the three German games of "mill," "siege," and "travel" require some explanation. For the mill game there are 18 disks, nine for each of the two players. The disks are marked or shaped in two different ways, so that each player can distinguish those which belong to him. "A" places a disk on the board, in one of the little holes. Then "B" places one. Thus they continue, each one trying to place three of his own in line along the grooves, and at the same time trying to prevent his opponent from getting three of his disks in line. Three disks in a line, along a groove, constitute a mill. If a player succeeds in forming a mill, he is entitled to take one of his opponent's disks from the board, and keep it. When all of the disks have been placed, the players take turns in moving one disk at a time from one hole to an adjacent one, along the groove, thereby trying to form mills. When a player has only two disks left, he loses. When the disks are so arranged that neither player can move, the game is called a tie, and must be started anew.

The travel game is played with two dice and the other paraphernalia, as pictured. Little pins or tacks may be used to represent the eyes of the dice. Each player has a distinguishing pin as his "traveler," and moves along the squares according to the number recorded when he throws the dice. A guide is chosen from among the players, who receives from each four buttons or beans, representing travel money. When a player comes to a number which is already occupied, he takes his position on the preceding number. At number five is a bridge. A player stopping here must pay two buttons to the guide, as toll. At nineteen is an inn, where anyone who stops has to pay three buttons. At forty-two is a maze. Who stops here must return to twenty-three. At twenty-five is a prison, where a player must stay until one of his opponents touches the prison. The newcomer must take his place and wait till the next victim comes. At thirty-eight is a grave. This means death, and the player must begin anew. Forty-five is a great obstacle. One pays two buttons and misses his turn at the dice thrice. He who touches at points twenty, thirty, and forty, may advance ten spaces. When a player throws just enough to carry him into forty-eight, he wins the game and receives all of the money from the guide.

The game of siege may be played by two players, the besieger and the besieged. The latter holds the fort (the little square with nine holes) in which he sets his two men, the pointed figures in the picture. The remainder of the board, consisting of 24 holes, is occupied by that many figures, the soldiers of the besiegers. All holes are connected by grooves or tacks. The besieged may move his men forward or backward, along all lines within and without. The object of the besieger is to occupy the holes within the fort. The besieged moves first, and alternates with the besieger. They move one hole at a time, and only one figure at a time. The besieged may move a besieger from the field, and occupy his place if the latter has an unoccupied hole behind him, and is directly confronted by the besieged from before. Where there are two, or more, besiegers in line, with an unoccupied hole between them, and the besieged is directly in front of the first, the latter may remove both from the field, and occupy the point behind the last besieger thus disarmed. Under these conditions alone may the besieged return at once to an unoccupied hole within the fort. If all points are occu-

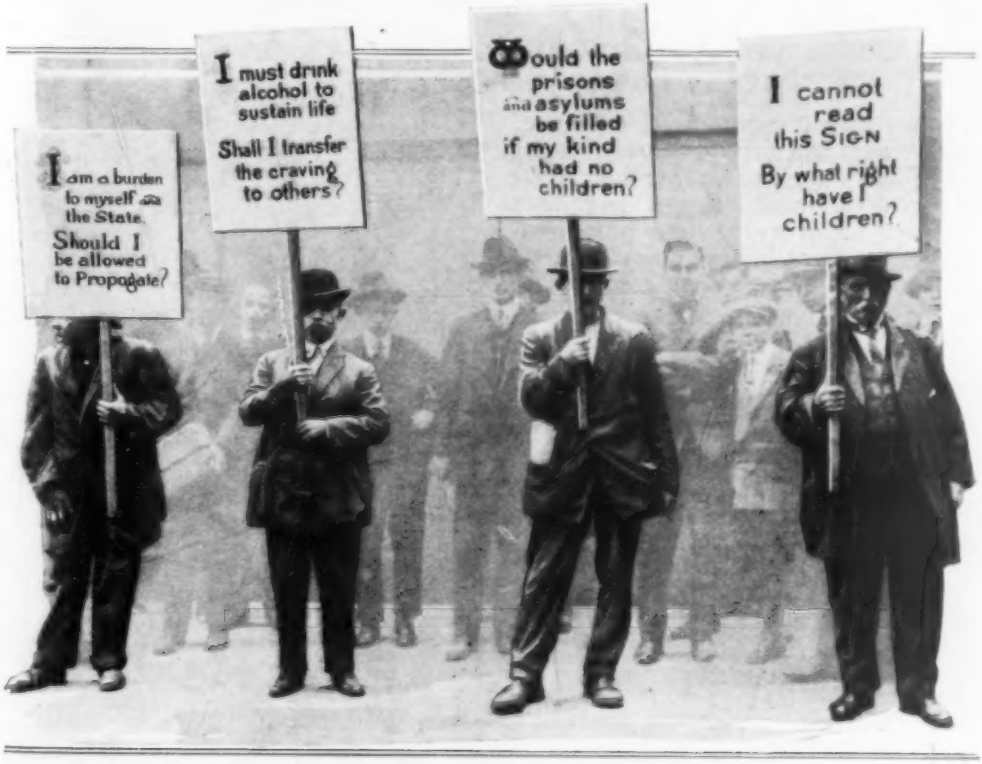
pied there, the besieged must consider himself captured, and the fort lost. When the besieger has only nine men left, any of whom do not occupy the fort, the besieged wins. If the besieged is locked in the fort, so that he can make no further move, he loses the game. When the besieged is locked in and there are not more than nine besiegers, the game is a tie and neither party wins.

These games, so commonly used in institutions, should be introduced into every private home which has one or more blind members. They afford pastime without danger, and the sightless soon become proficient players and often worthy opponents of anyone.

HUMAN WRECKS IN NOVEL EUGENIC PARADE

The dependent, alcoholic, criminal, and illiterate classes were individually represented by four men having the appearance of human wrecks who paraded through the Wall Street district of New York recently. The novel feature of the parade, or "exhibit," was that each man carried a sign calling attention to his particular deficiency and questioning his own right to have children. The evident purpose of the parade was that of presenting a convincing argument in favor of eugenic marriage, and it is said to have been organized by a medical journal that is conducting a campaign for the promotion of this reform. The paraders with their unique signs were successful in attracting the attention of thousands of spectators along the streets.

¶Illuminating gas is being produced in Sweden from old railway ties.


I am a burden to myself & the State. Should I be allowed to Propagate?
I must drink alcohol to sustain life Shall I transfer the craving to others?
Would the prisons and asylums be filled if my kind had no children?
I cannot read this SIGN By what right have I children?

"Down-and-Outs" as They Appeared in a Eugenic Parade through the Wall Street District of New York

SUCCESSIVE RECORDS ARE PLAYED AUTOMATICALLY

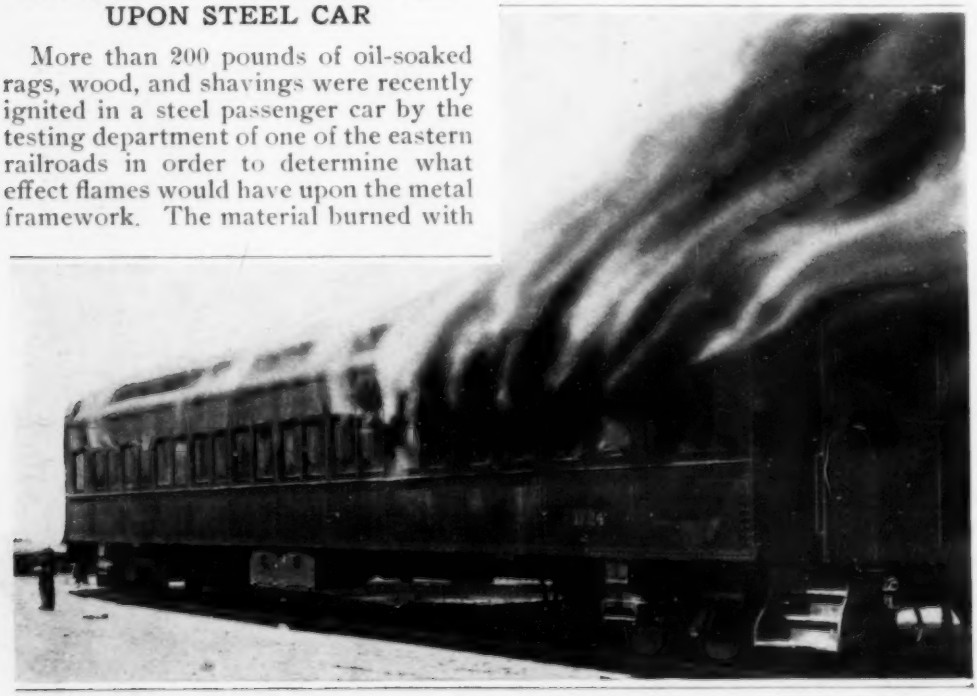
A phonograph has appeared which is designed to play a number of records in succession, and to make the change from one record to the next automatically. Twelve wax cylinders may be placed on the machine at a time, a revolving-wheel arrangement bringing one record after another under a diamond-point reproducer. Setting a convenient push button controls the number of selections the machine renders before stopping.

STUDYING EFFECT OF FIRE UPON STEEL CAR

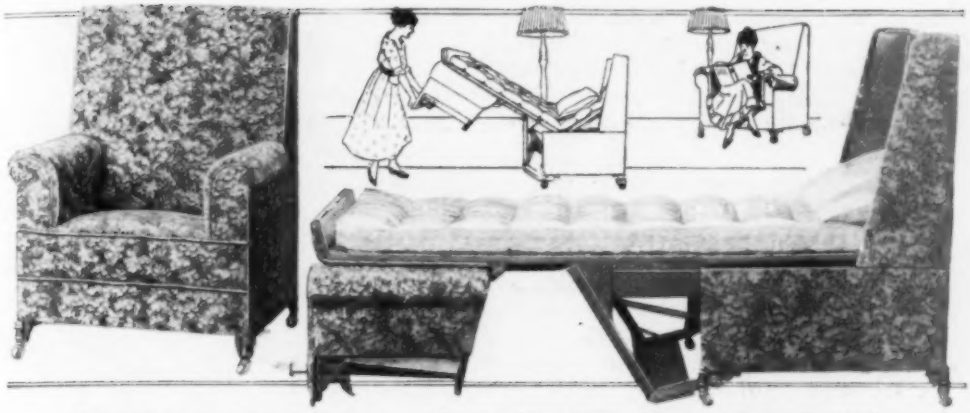
More than 200 pounds of oil-soaked rags, wood, and shavings were recently ignited in a steel passenger car by the testing department of one of the eastern railroads in order to determine what effect flames would have upon the metal framework. The material burned with great heat, but without causing distortion or serious injury to the car proper. Some of the upholstering, paint, and window panes were damaged, of course, but this was expected, naturally. The result of the experiment showed that the car was capable of withstanding fire and therefore up to the standard demanded by the company in that particular. The incident furnishes an interesting example of the thorough manner in which some railway companies test equipment and supplies before accepting them.

EASY ARMCHAIR AND BED MADE IN ONE PIECE

One of the ingenious pieces of combination furniture that has recently been introduced for use in city flats and small houses is a large, comfortable armchair which in a few seconds may be converted into a single bed. Its framework is constructed entirely of steel, making it both sanitary and substantial. It is covered with different



One Way of Determining the Quality of a Steel Passenger Car Is to Build a Hot Fire within It



When Used as a Chair It Is Large and Comfortable. Only a Few Seconds are Required to Convert It into a Single Bed

materials, such as tapestry, leather, and velour, for living-room purposes, and cretonne, for a sun parlor, sleeping porch, or bedchamber. When unfolded, a bed, 6 ft. 9 in. long, is provided. There is sufficient space available to allow the bed to be fully made up before it is closed for the daytime. The chair is of ordinary appearance and has practically nothing about it to show that it is in reality a folding bed. When it is desired to use it as a couch, the head of the bed may be elevated to suit the user.

MUSKOGEE TO BELT CITY WITH LONG GAS LINE

Through the efforts of the Greater Muskogee Association, a community organization of Muskogee, Okla., the city has voted $350,000 worth of bonds to build and operate a pipe line to the big gas fields lying near the place, for the purpose of furnishing four-cent gas in large quantities to manufacturers. The line will be made of 8-in. pipe, and will be about 20 miles in length for the part about Muskogee. A main supply line will run from this belt to the heart of Oklahoma's gas region, a distance of about 30 miles in all. It has been estimated locally that there is already enough gas developed to supply Muskogee with a hundred million feet daily, and the claim is made that the field is not more than one-fourth developed.

HANDS ON WATCH MOVE IN REVERSE DIRECTION

A jeweler has devised a watch which runs backward, the figures on the dial being arranged in opposite direction to the usual kind. The watch was invented at the suggestion of a left-handed person who complained that it was always hard for her to tell time on the average clock, because she thought "left-handed." With the new type of dial the process of reading the hands was easier. Other left-handed persons seeing the new watch agreed that they could read it with more facility than

Time on This Watch Turns Backward in Its Flight

the other type, and in a little while there was a general demand for the odd timepiece. A company has been organized and left-handed watches and clocks in all sizes are now manufactured.

DISTANCE GAUGE IS AID TO PHOTOGRAPHERS

To assist amateur photographers in readily estimating focusing distances, a simple instrument has lately been

Simple Instrument Estimates Focusing Distances for Camera Work

produced. A handle is provided by which the user holds the instrument out at a convenient distance, keeping a small indicator on the contrivance in line with his eye and the base of the object which he intends to photograph. On a scale opposite the pointer the desired distance is at once indicated. For accurate work the ground between the observer and the object should be level, and the scale on the device properly suited to the user's height. For this purpose a number of scales are provided with the instrument.

¶An ingenious method, just discovered, for smuggling benzine from Holland into Germany consists in inclosing benzine containers in hollowed-out spaces in the tombstones intended for the graves of German soldiers.

KIOWA INDIAN BOYS TAUGHT FARMING

Each of the Kiowa Indian boys attending the Riverside boarding school near Anadarko, Okla., is required to take the responsibility of tilling a plot of ground 11 ft. square. In spite of the diminutive size of these "farms," especially as judged by Oklahoma standards, the plan is said to be satisfactorily serving its purpose, which is that of providing the students with practical instruction in farming. Each of the little farms is an experiment station supplementing the work in the classroom. Recently a waterworks system was installed at the school, and a main feed ditch has been made past each of the farms. With this equipment the students will be taught the most modern methods of irrigation.

FROM COAST TO COAST AND RETURN BY MOTORCYCLE

What is said to be the first motorcycle trip ever made from the Atlantic to the Pacific coast and return was recently completed by two women living in Brooklyn, N. Y. On the west-bound trip a route passing through Chicago and Kansas City and then over the Santa Fe trail to Los Angeles was followed. After a trip up the coast to San Francisco, the return trip was made over the Overland route through Nevada, Utah, Wyoming, and Colorado, and through Chicago to the East. A total of five months was required for making the 6,000-mile journey.

WHERE PARK HIGHWAY CUTS CONTINENTAL DIVIDE

One of the interesting stretches of the new park-to-park highway, extending between Yellowstone and Glacier parks, is the continental-divide section. This part of the road has been constructed by the forest service with the coöperation of the counties through which it passes. On the crest of the Bitter Root Range at Sula, Mont., a

Arch Marking the Continental Divide near Sula, Montana, One of the High Points on the Road

A Mileage Post on the Park-to-Park Road

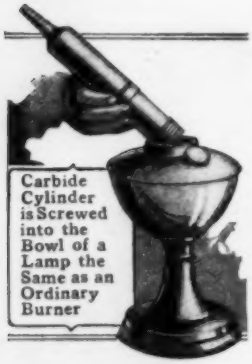
Danger Points are Indicated by Warning Signs

One of the Information Boards Erected on the Bitter Root Range

rustic archway has been erected. About 100 yards east of this log structure is the source of Trail Creek, which leads to the Missouri River. Camp Creek, a tributary to the Missoula River, which feeds into the Columbia, begins about one mile to the west. Signboards carrying information of interest to overland tourists are attached to the supporting columns on each side of the arch. The mountainous part of the continental-divide section is about seven miles in length and much of it is margined by cliffs and precipices. Dangerous points in the road are marked by warning signs, and the respective distances to various places are likewise given at intervals. The road will be opened to the public in 1916, and it is expected that a motor-stage service will be inaugurated between the two parks.

CONVERT KEROSENE LAMPS INTO CARBIDE BURNERS

Germany's shortage of fuel oils has been responsible for the introduction of small acetylene generators which enable ordinary kerosene lamps to be converted into gas lights. These are being used particularly in rural districts and other places where electric or gas - illuminating facilities are not available.



Carbide Cylinder is Screwed into the Bowl of a Lamp the Same as an Ordinary Burner

One of the devices consists of a cylindrical receptacle that may be screwed into a lamp in place of the usual burner. It is filled with a specially prepared carbide and the lower portion extends into the bowl, which is half filled with water. This will burn for a number of hours on one charge, and gives off a brilliant light. It is refilled with carbide as the latter is needed. Lamps designed solely for burning acetylene are also being used, but these do not represent new inventions. They are available in various sizes and types.

REPEATING CONTACT MINES USED BY GERMANS

According to unofficial advices from Paris, a new type of marine mine has been developed by the Germans and is being used off the coasts of France and Great Britain. The chain which holds the floating device in place is attached to a magazine anchor which rests on the bottom of the ocean and keeps one or more mines in reserve. When the first bomb is exploded, or removed by a sweeper, the pull on its chain releases one of the auxiliary bombs and causes it to rise from the bottom. It is not known exactly how this is accomplished, but it is assumed that some arrangement is made to permit the disengagement of the first mine from the anchor chain so that the anchor itself will remain intact. The principle is the same as that of a gun in which fresh cartridges are slipped into place as rapidly as the piece is discharged.

GOLD MEDALS AWARDED AT SAN FRANCISCO FAIR

In the design of the gold medals awarded to exhibitors at the Panama-Pacific Exposition a successful attempt has been made to produce a design of real artistic worth. One side of the medal represents the meeting of the Atlantic and Pacific oceans, symbolized by two nude figures, a man and a woman, joining hands across the Isthmus of Panama. Under the figures is a Latin inscription the translation of which is "Man Joins What God Parted." On the reverse side of the medal are representations of the Tower of Jewels, the dominant feature of the exposition, and of the Fountain of Energy. The design was furnished by John Flanagan, an American sculptor and designer of medals and medallions. The medals, which are awarded as first prizes, were made at the United States mint at Philadelphia.

On One Side of This Gold Medal Issued by the Panama-Pacific Exposition Is a Symbol of the Meeting of the Atlantic and Pacific Oceans at Panama; on the Reverse Side Are Representations of the Tower of Jewels and the Fountain of Energy

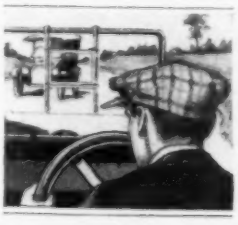
DOTS AND DASHES ARE USED IN TALKING TO EDISON

For many years the deafness of Thomas A. Edison has been a thing of quite general knowledge. In this connection two rather interesting incidents have happened of late. During an early meeting of the naval advisory board an associate of Mr. Edison was seated beside him. When remarks were addressed to the inventor, and also when he wished information, he and his companion communicated in the Morse code. This was done by one of them tapping gently with a forefinger against the other's wrist.

It was shortly after this that a banquet was given at San Francisco by local telegraphers in honor of Mr. Edison. Telegraph receivers were arranged before various of the guests, senders placed in front of the speakers of the evening, and the instruments connected to wires, which were carried around the table on miniature poles. The address of welcome as well as all of the subsequent talks, including Mr. Edison's, were tapped off in code, making the occasion a speechless one.

MOTOR-CAR ATTACHMENT COUNTERACTS GLARE

A light diffuser designed to be carried on the windshield of an automobile is the latest means for counteracting the glare from the headlight of an approaching car, as well as for preventing the eye strain caused by the glare of the sunlight on the roadway. The device consists of a square of special amber glass mounted in a frame made up of brass rods and so arranged that the glass can be placed in any position to suit the line of vision of the driver. The device is easily attached to the windshield or removed from it when not needed.



LIVING TREE USED AS A "GIN POLE"

A Douglas-fir tree of large dimensions that happened to stand in the right position for the work in hand was cut off a hundred feet from the ground and then used as it stood for a "gin pole" in handling timber during a recent government timber sale in the Wind River Valley in Washington. Preparing the tree for this use was recognized as a dangerous undertaking, and the foreman accordingly called for volunteers to do the work. The workmen first climbed the tree by means of telephone climbers and straps. The tree was about 200 ft. in height. The lower branches started at a height of about 100 ft. above the ground, and it was at this point that the top was cut off. The hazardous work of cutting off the hundred-foot top with its heavy branches and letting it drop to the ground was accomplished without accident. Then the iron bolts that serve as steps for reaching the top were driven into the tree and the novel "gin pole" was ready for the installation of the necessary lines and pulleys.

Douglas-Fir Tree Cut Off a Hundred Feet from the Ground and Used as a "Gin Pole"

NEW PRINTING TELEGRAPH SYSTEM HAS GREAT CAPACITY

STRIKING efficiency in telegraphic communication has been reached of late through the development of a new transmitting and receiving mechanism which is rapidly being put into general use in large cities throughout the country. It is a printing telegraph system of pronounced flexibility which materially increases the traffic-carrying capacity of existing wire facilities.

The apparatus is quite complex in some particulars. It is so simple in operation, however, that it obviates the need of employing telegraphers and resolves the work of sending and receiving messages to a simple routine of operating a typewriter keyboard and tearing off one communication after another as they are printed on a roll of paper. In this way a girl, entirely unversed in the Morse code and the use of a key, but experienced as a typist, is made just as capable of sending a telegram from New York to Chicago, or some other point, as if she were a veteran telegrapher.

Important as is this phase of the system, it is quite incidental when compared with some other of the attributes of the apparatus. The high-speed transmission and great volume of traffic that may be handled over one line represent the vital points of this invention. Although not representing the limit of flexibility of the system, quadruple-duplex operation is made possible. By this it is meant that four channels in each direction are provided on a single line. While greater speed is easily attained, 45 words a minute is the average rate of transmission used, which means that 180 words may be sent in each direction over a wire in one minute, or a total of 360.

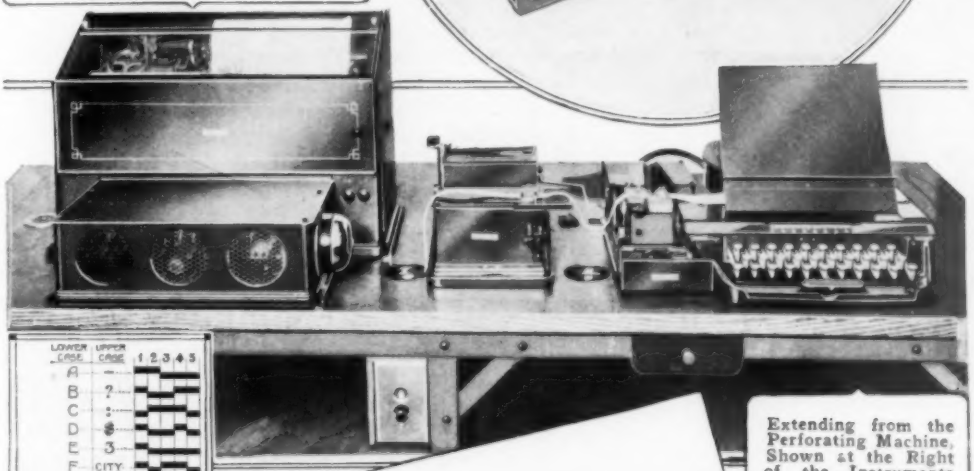
The instruments included in the new equipment consist essentially of a tape perforator, electric transmitter, a distributor, a receiving printer, and an automatic controller. To understand the operation of these devices it is first necessary to differentiate between tape transmission and the old method. The code used is known as an equal-letter, five-unit plan. Each individual signal requires exactly the same line-time for transmission and consists of five units, whether it represents a letter or a figure. A narrow tape is punched crosswise, each line of holes representing some specific character. This is done by a small machine fitted with a standard typewriter keyboard. When the letter "A" is struck, the tape is perforated with five holes representative of that letter in the code. An average of about 45 words a minute are punched in this way. The tape, as it is perforated, is extended to the transmitter. Fingers in this instrument pass through the holes and operate a series of levers which set up in turn the proper combinations for the signals.

Positive and negative impulses sent out by the transmitting mechanism actuate the printing receiver at the other end of the line and cause the message to be typed out. Every function performed by the printer is controlled by the perforations in the distant tape, even to the extent of line spacing and carriage shifting.

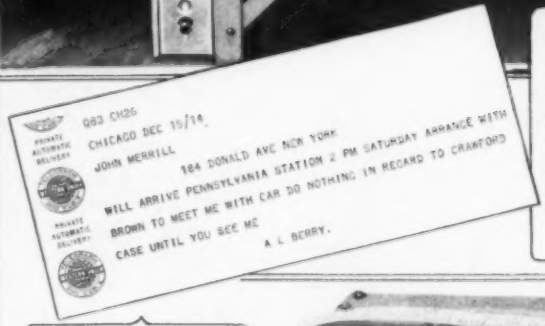
This explains roughly the manner in which the telegraphing is done. The most salient feature, however, is that not merely one message may be transmitted in each direction over a line in this way, but four messages in each direction, or a total of eight, simultaneously. This obviously requires the use of a battery of four transmitting and receiving instruments. The device known as the distributor makes this possible by alternately connecting first one and then another of the transmitting and receiving instruments for a brief flash in which one signal is sent. Thus in sending four distinct messages, a single letter of the first, second, third, and fourth is sent successively, and the routine then repeated. From this it may be seen that when a signal is being sent from one transmitter to a receiver, the other three senders and printers are not literally in operation.

Of the several instruments used, the distributor is the most interesting. To

The Above Instrument, a Distributor, Makes the Multiplex Operation Possible. It Is by Using an Apparatus of This Kind at Each End of a Line that the Signals Rendered by Different Transmitters are Directed to the Proper Receivers. At the Right Is a Perforator

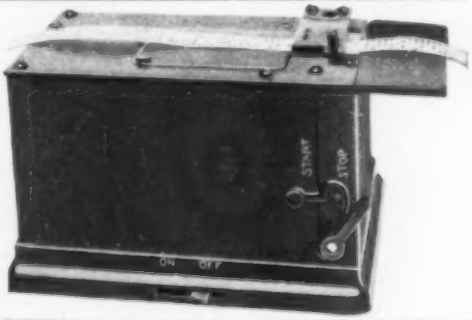


LOWER CASE	UPPER CASE	1 2 3 4 5
A	—	
B	?	
C	:	
D	$	
E	3	
F	CITY	
G	&	
H	£	
I	8	
J	3/8	
K	)	
L	(	
M	.	
N	,	
O	9	
P	0	
Q	1	
R	4	
S	THIRDIN	
T	5	
U	7	
V	;	
W	2	
X	/	
Y	6	
Z	"	
CARRIAGE RETURN		
LINE FEED		
LETTER SHIFT		
FIGURE SHIFT		
SPACE		


Q83 CH26
CHICAGO DEC 15/14
JOHN MERRILL
184 DONALD AVE NEW YORK
WILL ARRIVE PENNSYLVANIA STATION 2 PM SATURDAY ARRANGE WITH
BROWN TO MEET ME WITH CAR DO NOTHING IN REGARD TO CRAWFORD
CASE UNTIL YOU SEE MC
A L BERRY.

Extending from the Perforating Machine, Shown at the Right of the Instruments Grouped Above, Is a Transmitting Tape Which is being Fed into a Sender. Next to the Latter Is a Receiver Which Prints the Messages Ready for Delivery in the Form Shown at Left

The Arrangement of the Five-Unit, Equal-Letter Code is Shown at the Left. Just as Much Line-Time is Required in Sending One Character as Another. The Five Signals Shown below the Alphabet are Used in Controlling the Printer. A Close View of the Transmitter is Given at the Right



describe it briefly, its face is made up of concentric, segmented rings over which a series of contact brushes revolve. The outer of these is the receiving ring; the second, the correcting ring; the third, the sending ring; the fourth, the local ring, and so on. The outer one may be considered as being divided into quadrants, each including 10 segments, of which only alternate ones are used for selecting purposes. The third, or transmitting ring, is similarly divided and consists of 20 segments. A distributor is used at each end of a line, the sending ring of the one selecting the impulses and permitting their transmission to the quadrants of the receiving ring on the other.

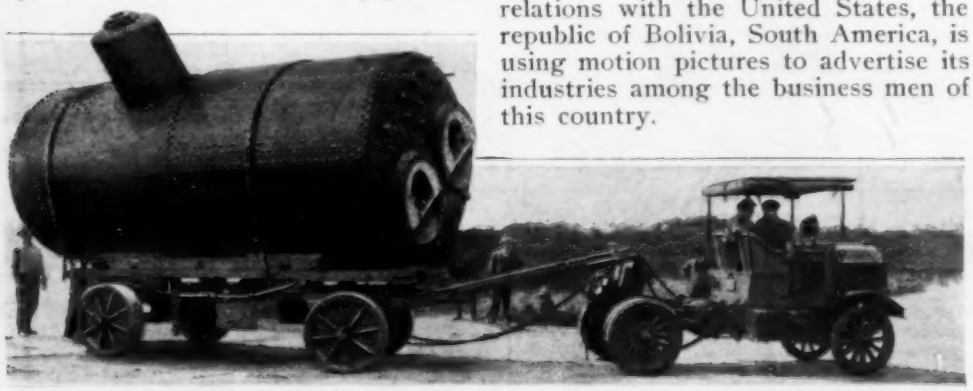
Since a single signal is rendered by five distinct impulses, it may be seen that one of its units is transmitted from the sending ring of the distributor each time the contact brush passes over one of the five segments in any one of the quadrants. The distributors at opposite ends of a line run in synchronism, so that when contact is made with one segment the impulse goes through the proper plate on the receiving ring of the other instrument and is thus conveyed to a specific printer. The synchronism is maintained by a very ingenious method through which the signaling impulses are made to provide correcting impulses.

The automatic controller, previously referred to, stops the sending instrument when the tape becomes taut. Thus when the perforating machine is not in operation, the transmitter continues its work only until it has taken up the slack in the tape, when it begins sending out spacing current which produces no effect upon the receiving printer at the opposite end of the line.

This explains only one of several methods of operation which are possible with the new system. Two-way operation, double-duplex, triple-duplex, and other methods, may be employed.

AUTO TRACTOR PERFORMS HEAVY HAULING FEAT

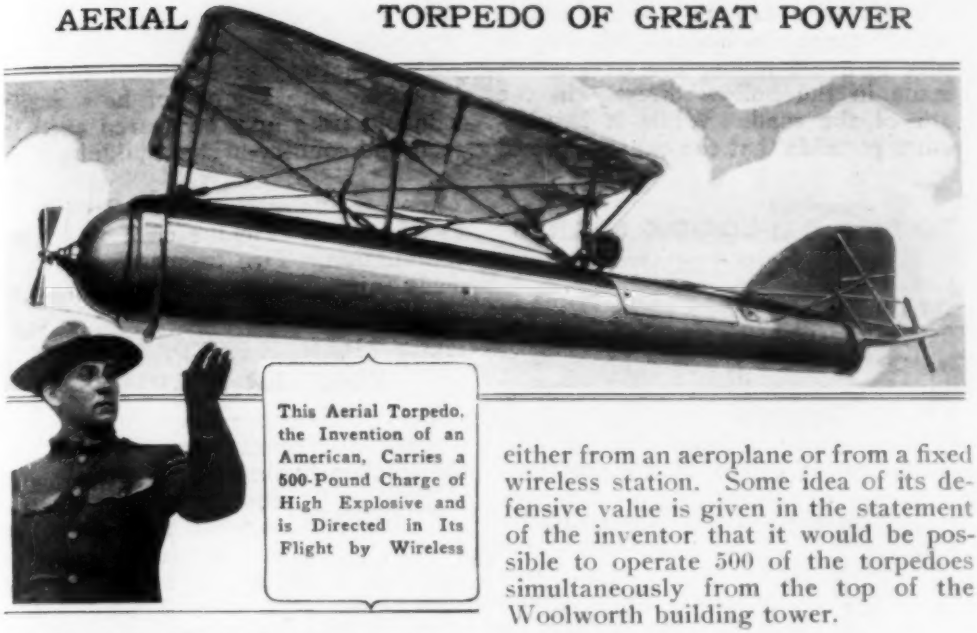
An eastern contractor was recently confronted with the task of moving a 33-ton boiler a considerable distance cross-country from one power plant to another. At first he intended using horses for the work and figured it would take at least 28 of the animals to pull the heavy weight, together with a possible 10 or 12 more to help get the thing started. However, an opportunity unexpectedly presented itself to make use of a gasoline tractor for the work. The tractor was rated at only 5 to 15 tons' capacity and the boiler and wagon weighed 41 tons in all. Curiously enough the tractor started this immense load without assistance and hauled it safely to its destination.



Automobile Tractor Successfully Hauls 41-Ton Load, a Task Ordinarily Requiring 30 to 40 Horses

¶With a view to closer commercial relations with the United States, the republic of Bolivia, South America, is using motion pictures to advertise its industries among the business men of this country.

AERIAL TORPEDO OF GREAT POWER



This Aerial Torpedo, the Invention of an American, Carries a 500-Pound Charge of High Explosive and is Directed in Its Flight by Wireless

An aerial torpedo that carries 500 lb. of high explosive and is controlled in its flight by wireless has been invented by an American and was recently placed on exhibition in New York. Carrying such a charge as it does, this torpedo is by far the most destructive projectile of the kind ever made. The German aerial torpedo described in a recent number of this magazine, while controlled by wireless and used with destructive effect against the trenches of the allies on the western front, carried only from 100 to 150 lb. of high explosive. The new torpedo is 7 ft. 2 in. long and is equipped with wings somewhat like the wings of an aeroplane and with two propellers, one located at the bow and the other at the stern. Through the wireless control of the propelling and steering apparatus it can be steered up, or down, or horizontally, at the will of the operator. It is claimed by the inventor that one torpedo would be sufficient for destroying the post office in New York, while a "fleet" of such torpedoes operated from a wireless station 50 miles distant would be capable of depopulating a city the size of New York in a period of 24 hours. The torpedo can be operated either from an aeroplane or from a fixed wireless station. Some idea of its defensive value is given in the statement of the inventor that it would be possible to operate 500 of the torpedoes simultaneously from the top of the Woolworth building tower.

BRIDGE CURVED ABOUT TREE IN PACIFIC NORTHWEST

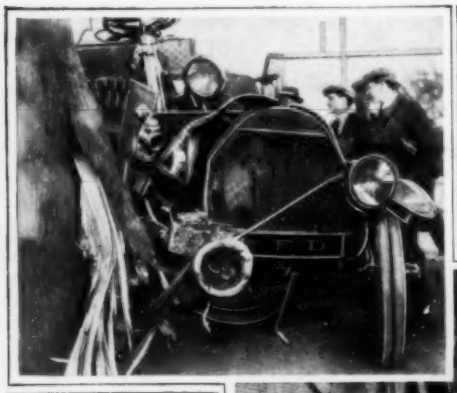
As an illustration of how widespread the popular movement for the conservation of our trees has become, a small wagon bridge, which was constructed across a ravine in the Pacific Northwest some time ago, was curved

In Order to Avoid Felling This Cedar the Bridge was Built around It

so as to pass around a giant cedar. The structure was built in this way in order to avoid felling the tree, which stands in the hollow directly in the path of the road. While it is altogether possible that the expenditure of labor which would have been required in removing the tree had much to do with the latter's preservation, the case serves as an example of how easily valuable trees may be spared even in road and country-bridge building.

BOILER EXPLOSION STARTS TRAIN OF TROUBLE

Misfortunes of many kinds struck a Massachusetts town recently. Trouble started when a boiler blew itself out of a solid brick building and landed in a neighboring yard, a mass of dented steel and tangled piping. As a result of the explosion, an attending engineer was instantly killed and 12 others seriously injured, not to mention damage caused by the demolishing of several brick walls and the blowing in of numerous windows. But this accident was indirectly the cause of still another. A fire truck had been sent speeding to the rescue immediately after the explosion. In the excitement, it ran squarely into a tree, breaking a wheel and smashing up the whole front end so completely as to put the machine entirely out of commission. Two firemen were seriously injured in this latter accident.



This Fire Truck Smashed into a Tree While Speeding to the Rescue of Victims of a Boiler Explosion. Two Firemen were Seriously Injured

In Exploding, the Boiler Demolished the Brick Walls of Its Building and Landed in a Neighboring Yard. The Engineer was Instantly Killed

HOW FRANCE PREPARES MEAT FOR HER SOLDIERS

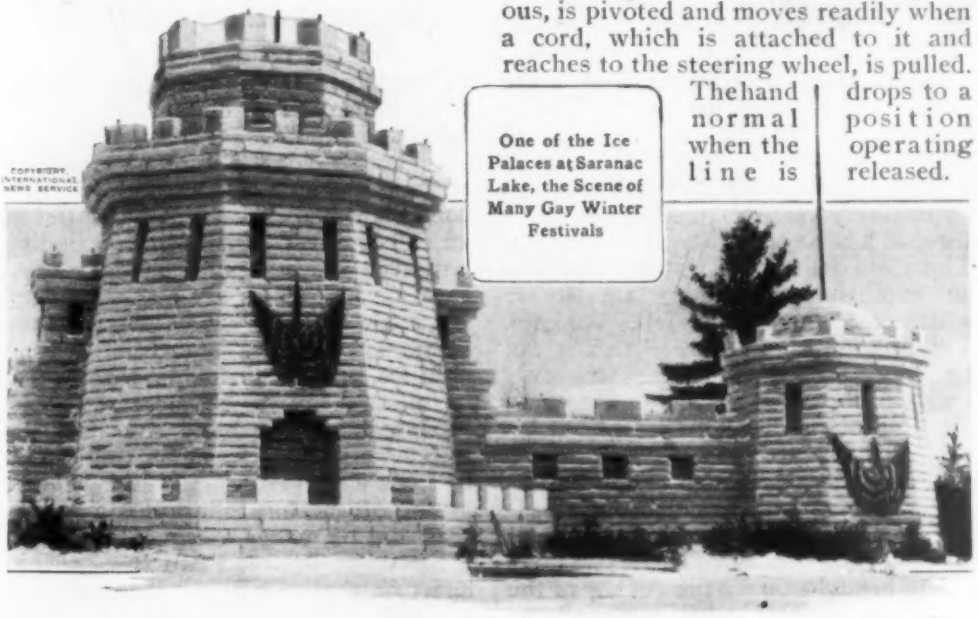
Two different processes are employed in preparing canned beef for the soldiers in the French army. One consists of partly cooking the meat, allowing the resulting broth to jelly, and then packing it in cans while cold. By this method about 40 per cent of the water in the meat is evaporated, making it, therefore, a more concentrated food than if it were raw. After the cans have been packed they are placed in an autoclave for an hour and a half and kept at a temperature of from 115° to 120° centigrade.

While this method has proved very satisfactory, its general adoption has been hindered because the necessary apparatus is available in only a few of the French canning factories, most of which in the past have been devoted chiefly to the preparation of canned vegetables. Because of this it was first necessary in many instances to resort to the plan of packing raw meat in cans and then allowing it to cook in an autoclave. This has the disadvantage of making the food uninviting in appearance. To overcome the objection at least partly, a certain quantity of rice and agar-agar

is now added to the meat. Both the rice and gelatinous substance absorb a large part of the juices, while the former adds considerable to the nutritive value of the food.

FROZEN SARANAC LAKE HOME OF GAY WINTER SPORTS

During the winter season each year, Saranac Lake, which is situated in the midst of the Adirondacks of northern New York State, is the scene of an almost continuous ice festival. Elaborate outdoor carnivals, such as are quite unknown in many sections of the country, flourish week in and week out throughout the long, cold months, under the most pleasing auspices. Crystal-white castles of medieval architecture and other types of structures, many of them very ornate and all of them built of ice blocks and fringed with snow, grace various parts of the lake. Snowshoe races, skating tournaments, skiing, and ice boating are among the many sports indulged in. It is only the coming of spring that interrupts the gala affairs and puts an end to the gay palaces of Boreas.



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One of the Ice Palaces at Saranac Lake, the Scene of Many Gay Winter Festivals

TRAFFIC-WARNING DEVICE FOR MOTOR CARS

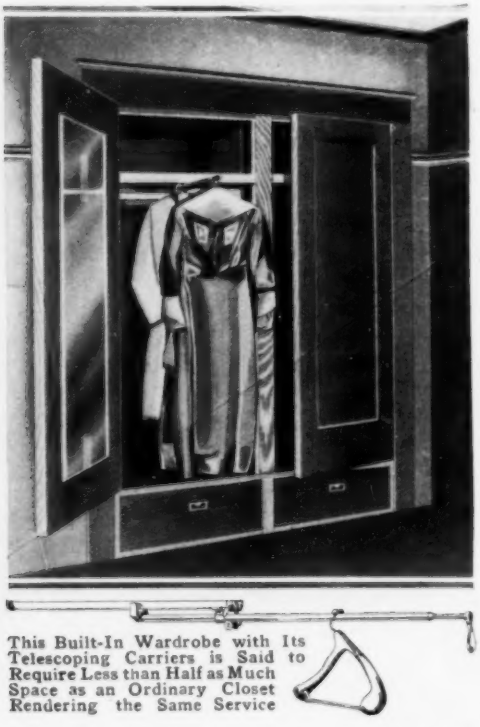
By attaching an indicator hand at the rear of his machine, a California motorist has devised a way of warning

The Indicator Hand is Operated by Pulling a Cord Extended to the Steering Wheel

traffic when he intends to slow down his car or turn a corner. The "wrist" end of the device, which is made of wood and painted so as to be conspicuous, is pivoted and moves readily when a cord, which is attached to it and reaches to the steering wheel, is pulled. The hand drops to a normal position when the line is released.

BUILT-IN WARDROBE WITH TELESCOPING CARRIERS

The provision of sufficient closet room without the sacrifice of an undue amount of space is often one of the greatest problems connected with the design of a dwelling house. As a solution for this problem a new type of built-in wardrobe, which is said to require less than half as much space as an ordinary closet rendering the same service, has recently been brought out. The main feature of this wardrobe is an extension telescoping carrier on which are hung wishbone hangers. This carrier is so mounted that it can be drawn out of the closet for easy accessibility when garments are to be hung up or removed.



This Built-In Wardrobe with Its Telescoping Carriers is Said to Require Less than Half as Much Space as an Ordinary Closet Rendering the Same Service

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¶One of the side plates of the battleship "Maine," which had been imbedded in the mud at the bottom of Havana Harbor since 1898, was recently brought up by the anchor of the American steamship "Esperanta."

MANY WOMEN GOOD DRIVERS OF MOTOR CARS

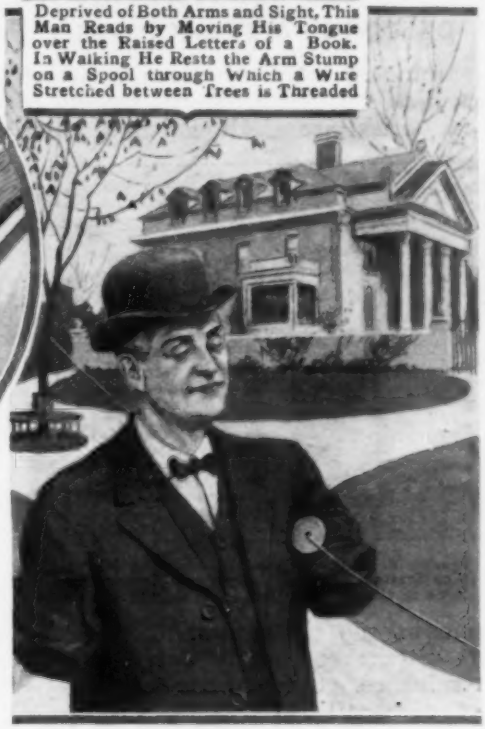
Many women are as capable of driving motor cars as are men, according to an expression made recently by the head of a New York automobile school. The fact that one often encounters feminine chauffeurs on the road who are a menace to traffic should not be used as a criterion. Poor drivers are very common among men. Thus it is argued that because some women are utterly incapable of handling a car safely, women as a class should not be considered incompetent as drivers any more than should men. In the mind of the above authority, women are quick thinkers and actors when emergencies arise, while many of them also develop into fairly good mechanics and are able to keep a car well tuned. A European correspondent, in telling of the work of a woman chauffeur of an ambulance, recently described her careful driving. He concluded by giving it as his opinion that women ambulance drivers "would be just about the best for that sort of work."

BLIND MAN WITHOUT ARMS READS RAISED LETTERS

One of the residents of a home for railroad men at Highland Park, Ill., is both blind and armless. In spite of this handicap he is far from being helpless, and incidentally offers a rather striking example of the resourcefulness sometimes shown by men when put to an extreme test. Instead of depending entirely upon others, he has learned to care for himself in a remarkable way. He reads and also walks about in the grounds without assistance.

Since he has no hands with which to follow the raised characters in books provided for the blind, he uses his tongue. To most persons this would be little else than a maddening, nerve-killing ordeal, but to him it is a way to read and he makes use of it.

Stretched between two trees 130 ft. apart on the lawn at the institution, is a wire on which a large spool has been



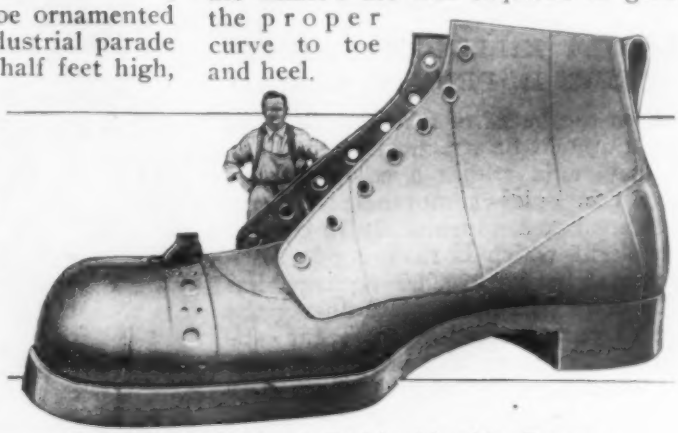
Deprived of Both Arms and Sight, This Man Reads by Moving His Tongue over the Raised Letters of a Book. In Walking He Rests the Arm Stump on a Spool through Which a Wire Stretched between Trees is Threaded

strung. On pleasant days when the man wishes to exercise, he is taken to the line by one of his comrades or an attendant. He rests the stump of an arm over the spool and walks to and fro, guiding himself without difficulty.

The loss of his arms took from this man the things most useful to those who are blind, the hands. Other substitutes for the eyes were all that could save him from utter dependency, and he found them.

METAL SHOE ADVERTISES FOOTWEAR DEALER

A huge sheet-iron shoe ornamented a float in an Illinois industrial parade recently. Seven and a half feet high, over 14 feet long, and nearly five feet wide across the sole, it amply fulfilled its mission of attracting attention to a certain footwear dealer's wares. Nearly 500 pounds of Nos. 24 and 26 gauge galvanized iron went into the construction of the shoe. A picture was taken showing an ordinary leather shoe from which the huge duplicate was made. The original covered only a small portion of the toe on the larger article. In making the latter every curve and angle in the original leather shoe was faithfully followed, each dimension being multiplied by 14 to give the proper size. Considerable skill in the tinner's art was required to give the proper curve to toe and heel.



Huge Shoe of Sheet Iron is Used for Advertising Purposes

MOTOR-CAR SERVICE DEPOTS DESIGNED ATTRACTIVELY

Motor-car supply stations, at which gasoline, oil, and a limited variety of accessories are dealt in, have been

The Graceful Lines of This Structure, a Motor-Car Service Station, Make It Attractive, Rather Than an Eyesore to the Neighborhod in Which It is Situated

springing up throughout the residential districts of nearly every city of prominence. Often these depots consist of small brick huts, sheet-iron shacks or frame structures, most of them unsightly buildings which detract from the appearance of the neighborhoods in which they are located. In California, and particularly at Los Angeles, this condition is being ameliorated by the erection of small, attractive structures designed after the old Spanish missions of the Pacific coast and Southwest.

BLIGHT KILLING CHESTNUT TREES IN PENNSYLVANIA

It is the belief of foresters that the chestnut will be practically extinct in Pennsylvania within a comparatively short time unless comprehensive measures are taken immediately to combat the blight which is ravaging it. Approximately $70,000,000 damage has been done within the state during the last 10 years, according to recent estimates. In the vicinity of Philadelphia the conditions are worse than elsewhere. The tree is not only valuable for its nuts, but also for its lumber, which is utilized in the manufacture of furniture, in general construction work, and as material for poles. The bark is much used in tanning leather.

SILK SHADES FOR LAMPS TREATED WITH MICA

Ground mica is incorporated in a preparation which is being used in treating the inner surfaces of silk shades for gas and electric fixtures. Besides giving strength to the fabric and protecting it from the effect of heat, the minute particles of mineral tend to reflect much of the light that is ordinarily absorbed by such coverings. The shades are made in various colors and types for use with chandeliers, wall brackets, table lights, and floor lamps, and are fitted over wire frames. These are provided with grips which slip over electric globes and hold the shades firmly in position. A centering disk made of mica is used with each shade. This fits closely about the neck of a bulb, or rests on the top of it when the latter is held in an upright position, so as to remove the chances of the frame causing a short circuit. The top of the

Below is Shown One of the Shades Fitted to a Gas Lamp and Provided with a Heat-Intercepting Drum

The Shade for the Electric Lamp Above is Cut Away to Show Frame Construction

shade is covered with the same kind of material as is used for the sides. The fabric employed in the shades designed for gas lamps is chemically treated to insure against fire, while the holders are fitted with mica cylinders which are intended to intercept the heat given off by the burners.

HOME GROWERS TO SUPPLY FLOWER-BULB MARKET

Heretofore, the great bulk of flower bulbs sold by florists and seed dealers in this country has been imported from Holland, the annual importation amounting usually to about $1,000,000. To encourage the growing of the Dutch bulbs in this country, as well as to provide native American bulbs of a superior quality, the Department of Agriculture has established a bulb-propagating garden near Bellingham, Wash., where the conditions of soil and climate are similar to those in the Netherlands. It appears from experiments that some American-grown bulbs, especially tulip bulbs, are freer from disease, and blossom from five to seven days earlier, than those imported from Europe. Certain flower bulbs, among them tulip and narcissus, have long been grown in limited quantities along the Atlantic and Pacific coasts and in the region of the Great Lakes.

TEMPORARY ELEVATOR USED ON OUTSIDE OF HOTEL

In order to convey materials from the street to different floors of one of New York's large hotels, which was recently renovated and redecorated, an elevator shaft was constructed on the outside of the building. This was a frame structure and accommodated a large freight lift. Wood, plaster, paper, and other materials needed in the work, were unloaded directly from wagons and shot to the places where they were required, while all of the debris was lowered to the street in the same manner. The plan was adopted so that guests of the hostelry might not be disturbed or inconvenienced. Certain corridors were shut off while work

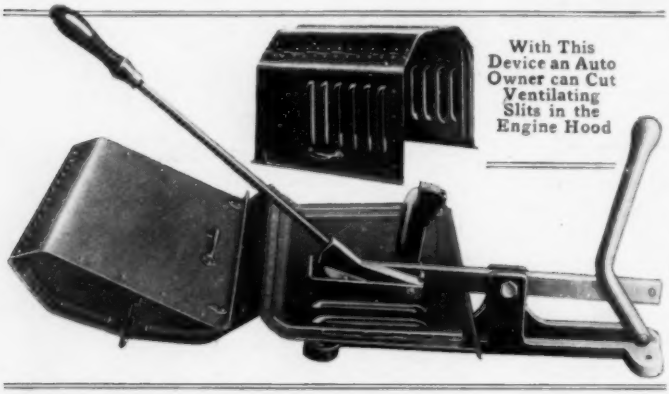
Freight Elevator on Outside of Hotel during the Latter's Renovation

was being done in the rooms reached by them, and little evidence was displayed of what was going on. The outside lift made it unnecessary for the workmen to employ the regular freight elevators in the building for their purposes.

¶The Gazette de France, established nearly 300 years ago and the oldest newspaper in France, has suspended publication. The publishers expect to resume publication at the end of the war.

MACHINE CUTS VENTILATOR SLITS IN AUTO HOODS

A late addition to the list of automobile tools consists of a machine for cutting louvers, or ventilator slits, in automobile hoods. Certain makes of machines are without louvers as a means for ventilating the region immediately over the engine, and to the owner who desires such a feature, the new instrument is a convenient article. It is simple in design, consisting only of a stamping die operated by a long lever. A suitable framework is provided to hold the hood in position while the work is being carried out.



With This Device an Auto Owner can Cut Ventilating Slits in the Engine Hood

NEW SCREWDRIVER COVERED WITH RUBBER INSULATION

Rubber is used as an insulating material for the handle and shank of a screwdriver lately designed for the use of mechanics and electricians when working on gas engines and electric apparatus. The tool tapers from the handle to the blade and has no shoulder or similar obstruction to interfere with its manipulation in difficult places. It has an overall length of 11¼ in. The blade constitutes the only piece of exposed metal, so the chance of short-circuiting is considerably less than it is when an ordinary instrument is employed.

FOREIGN MONEY IS BARRED BY CUBAN DECREE

Because of the excessive amount of European money in circulation throughout the republic, a decree has been issued by the president prohibiting the importation of all foreign silver and copper currency in Cuba except that of the United States. The further circulation of Spanish silver and copper money and the importation of Spanish and French gold in centenes and louis has also been barred. According to estimates there has been approximately $30,000,000 in Spanish and French gold and $5,000,000 in Spanish silver in circulation in Cuba.

BALLOONS CARRY POISONOUS GAS INTO FORTRESS

A new and ingenious method used by the Germans for attacking the defenders of a fort with poisonous gas is reported from Petrograd. Balloons that are shaped somewhat like those with which children amuse themselves, but larger, are used for the purpose. Each balloon is filled with enough illuminating gas to make it float, while in a bottom compartment is a quantity of the poisonous gas. The balloons are set adrift on a favorable wind, and when they are directly above the fort that is being attacked, the German sharpshooters puncture them with rifle bullets. The bursting of the thin covering completely destroys the balloon. The illuminating gas rises, while the poisonous gas, being heavier than the air, settles into the fort. It is reported that the poisonous gas from 1,800 of these balloons was dropped by this method into the fortress at Ossowetz, and that this was the principal reason why the defenders were able to hold the fortress for only two days.

AERIAL DEFENSES OF PARIS

By SEARLE HENDEE

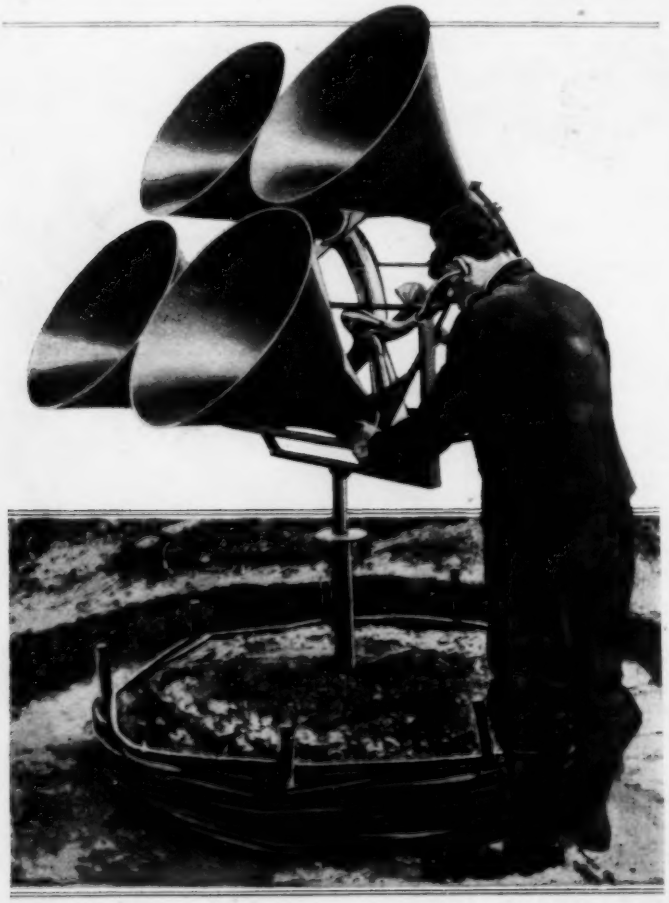
Imaginative Drawing Showing French Aeroplane Squadron in Flight, Piloted by One of the Big Battle Planes: The Supply Train Follows on Road Below

WHEN darkness and fog settle over London the city is gripped by fear and foreboding until the coming of dawn. Ears are strained to catch the first muffled sounds of approaching air craft. For many, the night is one of dread.

Paris slumbers peacefully, although but an hour's flight from the western battle front. A sense of security pervades the city. Aerial attacks are not feared and Zeppelins are thought of with mingled indifference and contempt.

While London is vulnerable from the sky, Paris is practically immune to danger. In the year and a half of aerial warfare the French have developed defenses faster than their enemy has improved its agencies of assault. For a year the capital has been comparatively free from anxiety. It has had but one Zeppelin visit, a so-called attack which was only an incident and netted the enemy nothing. The British metropolis, on the other hand, is protected

little more effectively than at the time of the first assault upon it. Its streets are darkened, it has an abundant supply of searchlights and aerial guns, and it maintains an aeroplane corps to resist invasion. Zeppelins, however, continue to cross the channel and bombard it while hidden in an impenetrable veil of fog.



This Detector, Which Consists of Four Megaphones Connected with a Microphone and Equipped with Receivers, is Used Both Day and Night: With It the Purr of an Aerial Engine may be Heard While the Machine Itself Is Invisible

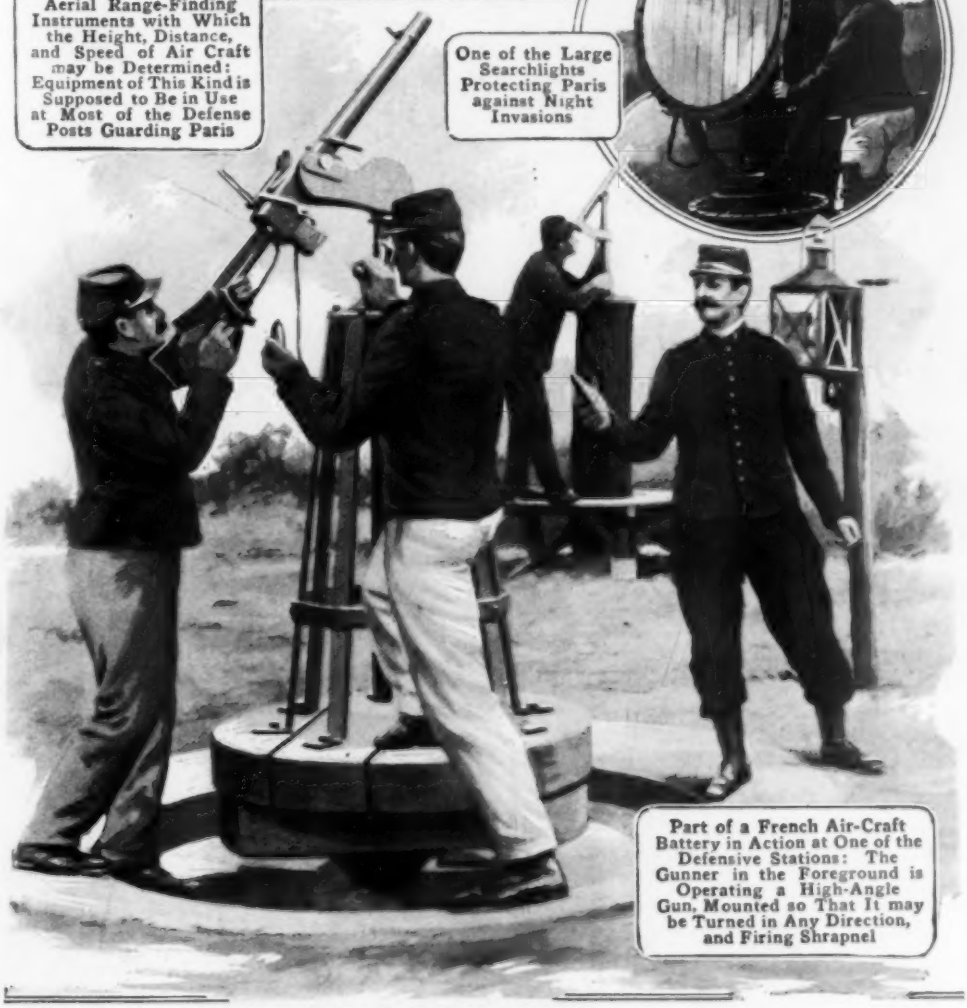
This shows briefly the contrasting conditions in London and Paris at the present time. The inability of the one to ward off assaults and the other's apparent freedom from trouble present graphically the difference between inadequate and scientific preparedness. The French have found a means of successfully combating Germany's air navy, while the English are only commencing to develop a comprehensive defense. British military authorities, according to recent advices, have of late made a careful study of the French system of aerial defense in the hope of finding in it a suggestion for the better protection of London. At the same time several prominent American inventors are supposedly engaged in the problem.

Complete details of the Paris system of fortification are not known publicly in America. Most information of this character has naturally been withheld by the censors. The general idea of the plan, however, is partially understood, as are some of the ingenious instruments used for detecting the approach of hostile airships and ascertaining their ranges. Prior to the opening of hostilities abroad aerial defense was a nonentity. Almost all progress in this direction has been recent, and it therefore constitutes not only an important but a very new phase of this latest method of warfare.

Organization forms the basis of the defense system at Paris. Observatory and artillery posts are arranged in long chains which extend throughout the city and radiate from it in all directions toward every part of the distant firing line. Each point is in telephonic communication with a central bureau situated in the city. The instant an enemy flying machine is sighted by any one of the numerous

Aerial Range-Finding Instruments with Which the Height, Distance, and Speed of Air Craft may be Determined: Equipment of This Kind is Supposed to Be in Use at Most of the Defense Posts Guarding Paris

One of the Large Searchlights Protecting Paris against Night Invasions



Part of a French Air-Craft Battery in Action at One of the Defensive Stations: The Gunner in the Foreground is Operating a High-Angle Gun, Mounted so That It may be Turned in Any Direction, and Firing Shrapnel

COURTESY ILLUS. LONDON NEWS: PHOTOS SUPPLIED BY THE SPORT AND GENERAL PRESS AGENCY, LTD.

lookouts, it is known at headquarters. Immediately an alarm is sent out to the posts in various zones. At scattered points squadrons of swift aeroplanes are in readiness to spring into the air and give chase to an invader, while at all the stations covering the country between the city and the battle front, aerial guns are trained and range finders prepared to cope with the enemy.

During the first few months of the war Paris was repeatedly besieged by German aeroplanes. The craft made their appearance continually, much to the anxiety of citizens and military authorities alike. A former head of the aeronautical department was recalled to the capital to devise a system of protection, and the present scheme is the result. Since its inauguration the city has felt no danger, although numerous airmen have endeavored to reach it on many occasions.

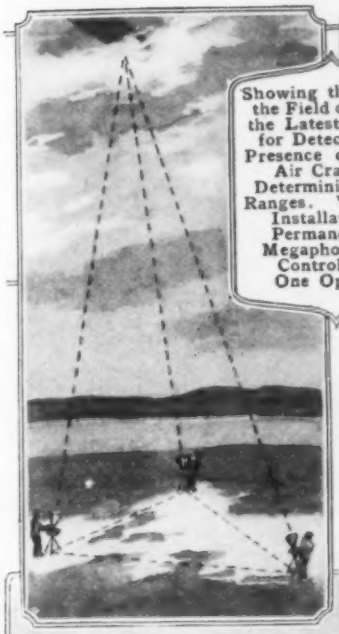
The vigil is maintained constantly day and night at the outposts. Each of these little stations has a battery of two, or more, specially designed, high-angle, air-craft guns mounted so that they may be turned to any point of the compass quickly. On an elevation a few feet above the guns, observers are stationed with binoculars. Close at hand is a sensitive sound detector, by which the approach of an aeroplane or Zeppelin can frequently be told before it is visible. Near at hand are range finders, specially designed for aeronautical purposes, and instruments for determining the speed and relative height of an aeroplane in flight. A powerful searchlight is usually mounted close to the post, so that its rays may be focused on night invaders to assist the range takers and gunners.

The type of detector used by the French is both ingenious and simple. One of the chief advantages of the device is that darkness and fog do not interfere with its efficiency. It may be used both day and night with equal success. Essentially it consists of a nest of four large megaphones, all of which point in the same direction. These devices are connected with a microphone which amplifies the faintest sounds gathered by the wide-mouthed horns. The apparatus is held in a frame mounted on a heavy rod fixed in the ground, or to some solid base, so that it may be swung in any direction. A telephonic headgear employed by the "listener" enables him to detect the purr of an aeroplane or dirigible engine that may be operating at any point over a wide radius. By adjusting the megaphones carefully, the approximate course of a flying machine and its relative distance from the post may be ascertained. The detection of such a sound is a signal for a careful lookout. Then, with long-range glasses, and at night by the aid of searchlights, the identity of a craft is determined. If it is an enemy machine, a squadron of craft and fusillade after fusillade of shrapnel are sent after it.

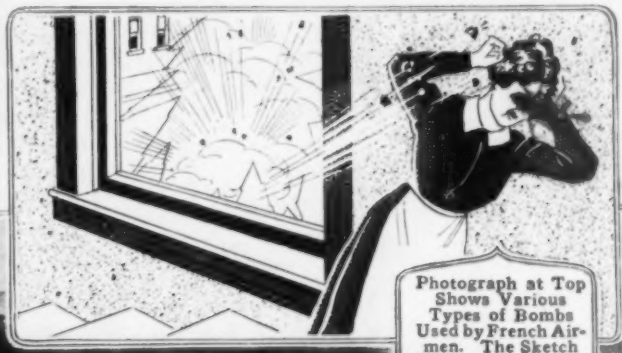
Other instruments are utilized which quickly determine the height, distance, and approximate speed of an approaching machine visible through glasses. These calculations made, the gunners are able to time their shrapnel fuses correctly and fire with considerable accuracy. The computations are produced by a sliding gauge, or dial, so that no time is lost in the process. The figures are corrected continually that the gunners' work may be made effective.

Reports from London indicate that a group of picked French airmen are now assisting the British aerial corps in combating Zeppelin invasions. The French method of attacking an enemy in the air differs from that of the English, and it is understood that it is being adopted at London. When a hostile craft is first sighted the French fliers shoot into the air and pursue the same general course as that taken by their adversary, rising gradually so as not to be outdistanced. In this way they head off the invading airship, climb above it and drop bombs. The English airmen have persisted in spiraling upward and gaining altitude at the outset of their chase. This plan, it is said, has given the enemy an opportunity to bombard the city and escape.

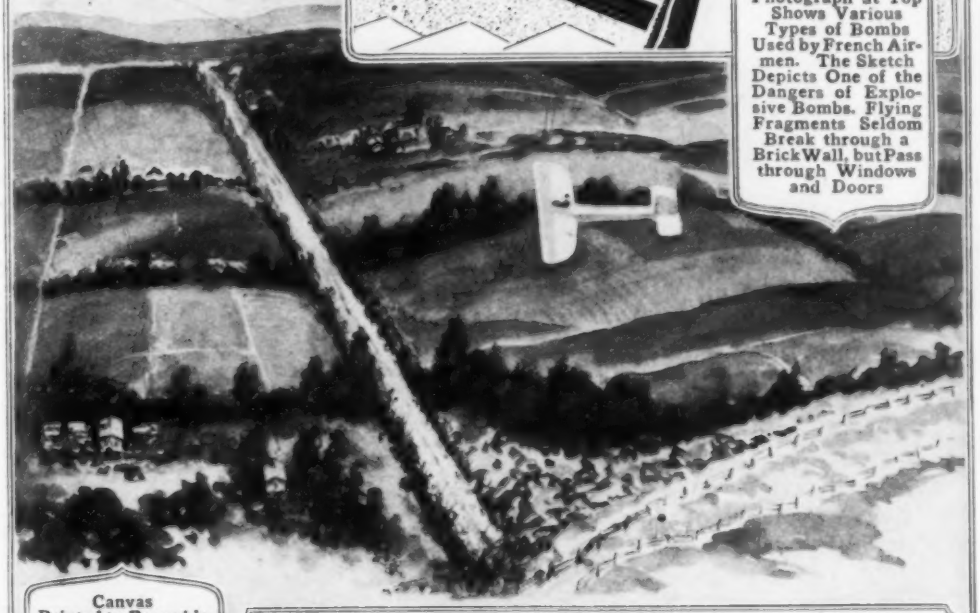
An American has developed an ac-



Showing the Use in the Field of One of the Latest Schemes for Detecting the Presence of Hostile Air Craft and Determining Their Ranges. When the Installation Is Permanent, the Megaphones are Controlled by One Operator



Photograph at Top Shows Various Types of Bombs Used by French Airmen. The Sketch Depicts One of the Dangers of Explosive Bombs. Flying Fragments Seldom Break through a Brick Wall, but Pass through Windows and Doors



Canvas Painted to Resemble a Highway Erected over a Road between Two Communication Trenches, and a Large Body of French Troops Moved without being Noticed by German Airmen. Diagram Shows Arrangement

curate system for detecting the approach of an airship and ascertaining its exact range while it is still invisible. This invention is of particular interest both because of its origin and the fact that it is quite similar to a plan which is being evolved for the protection of London. Large horns mounted similarly to marine compasses and fitted with microphones are placed at the corners of a geometric figure of known dimensions. This may be triangular or square in form. In the field each megaphone is attended by an operator who adjusts it to the angle which permits him to hear most clearly the sound of an approaching flying machine. Thus the various instruments are all focused upon the same point. The position of the air craft is the apex of a pyramid or cone, according to the arrangement of the horn units. Calculations then give the distance of the machine and its location.

When this system is permanently installed, as for the protection of a city, all of the megaphones are rotated by one operator. The horns are continually swung in different directions until the noise of an aerial motor is heard. Then an electric instrument is employed in place of the telephonic headgear. This device, similar in construction to dual galvanometers set with their needles pointing at each other, is more sensitive than the human ear and makes an accurate comparison of the volume of sound affecting the microphones. When the horns are adjusted so that the indicators point to zero, the flying machine has been located. The direction in which the horns are pointing indicate the angle. The distance of the target, which is considered the apex of the figure outlined by the megaphones, is almost instantly computed by means of a sliding scale. With this information the gunners are able to fire upon the unseen object. The horns, placed several hundred yards apart, may be moved in synchronism, so that the course of an airship can be followed and the range corrected. When the proper instruments are utilized for magnifying the sound, an air craft several miles distant may be detected and its range determined.

In addition to perfecting their remarkable system of defense, the French have developed their air craft in a noteworthy manner. Through the efforts of the aeronautical authorities the term "aerial navy" is no longer fictional. The nation has organized its air forces into squadrons composed of battle planes, cruisers, scouts, and "torpedo planes." The fleets maneuver in various formations as does an army regiment or naval squadron. The aerial fighters are organized in "esquadrilles," or squadrons, and are officially designated as such. A squadron is commanded by a commissioned officer who serves as a pilot, and is composed of six reconnaissance machines; two cruisers, each armed with a 3-in. gun; one large battle plane mounting two 3-in. guns and one machine rifle; nine motor trucks and trailers; nine portable hangars, and three motor cars.

The battle plane is understood to be three-decked, 30 ft. in height and 130 ft. in wing spread. It carries a complement of a dozen men and is equipped with either two or three engines. The 3-in. guns are mounted near the ends of its wings and the machine gun in the middle. Both it and the cruiser are recent developments. The latter is very swift in flight and has great climbing power. All of the machines are understood to be well protected with armor. Numerous squadrons of this formation have been organized. Some of them are being used for offensive operations against the Germans, while others are apparently retained for defensive purposes in and about Paris.

One of the most interesting of the many schemes France has devised for protection against German airmen was successfully employed some time ago in the Champagne district. It was necessary to move a large body of troops across an open place between two communication trenches which were more than a half mile apart. A large corps of artists were given the task of paint-

ing a long strip of canvas to resemble a road. In four days this part of the undertaking had been accomplished and the work of erecting the canvas on poles over a real road commenced. When the covering was in place the long columns of troops were marched beneath it in safety and without observation by the enemy. It was only early in the mornings and late in the afternoons that the passage could not be employed. At those times the shadows of the moving troops showed on the canvas like dark blotches, and might have aroused the suspicion of enemy airmen. At all other times throughout the day, however, the deception was complete. The canvas looked like the road it covered and it was impossible for an airman to detect the difference.

Efficient organization, the utilization of clever subterfuges, trained corps of aerial fighters, special instruments, and good marksmanship, in the main constitute France's aeronautical defenses.

ALASKAN DOGS FOR SERVICE WITH FRENCH ARMY

Because of the lack of suitable transportation facilities for the officers engaged in reconnoitering, the French troops operating in the mountains along the Swiss border found themselves seriously handicapped during the past winter. To overcome this difficulty the French government has bought more than 100 Alaskan dogs and with these the officers will be transported over the mountainous country in sleds. The dogs are to be driven by their former owner, who is one of the best known of Alaskan trainers. One team of these dogs has a record of 18 miles an hour maintained for days over the snow, and it is thought they will be ideally suited to the requirements of reconnoitering in the mountains during a winter campaign. With the dogs, which were recently shipped from Seattle, went a large consignment of the dried fish which constitutes their favorite food.

Group of the Dogs being Given an Airing at Seattle While En Route to France: Among the Animals Are Those Which Formed a Famous Team That Twice Won the Alaska 412-Mile Sweepstakes. At the Left Is a Pile of Dried Fish, the Dogs' Favorite Food

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The "Rookies" in Trenches Prepared to Hold Their Own Against the Invading Marines

Troop of Cavalry Skirting the Shore to Attack the Invaders in the Rear

VOLUNTEER "ROOKIES" AT FORT SHERIDAN

For four weeks during the latter part of September and the early part of October, 1915, nearly 500 men from civil life who had temporarily abandoned their business or profession for a period of military training, lived on the lake front at Fort Sheridan, Ill., as men of the regular army live, and submitted to the same regulations and did the same work. Several judges, at least one congressman, and others prominent in business and professional lines, were included in the corps of volunteer "rookies." The principal purpose of the encampment was to give the men a foundation of military training that would fit them to serve as officers of volunteers and as drill sergeants in case of war. A secondary purpose was doubtless that of demonstrating by means of an object lesson that a soldier cannot be made in a day—to show what it means in time and work to take a raw recruit and make him into a real soldier. Short as the time was, an immense amount of work was accomplished. The civilian "rookies" were drilled by men of

Naval Reserves Landing on Lake Michigan Shore to Attack the "Rookies" in Their Trenches

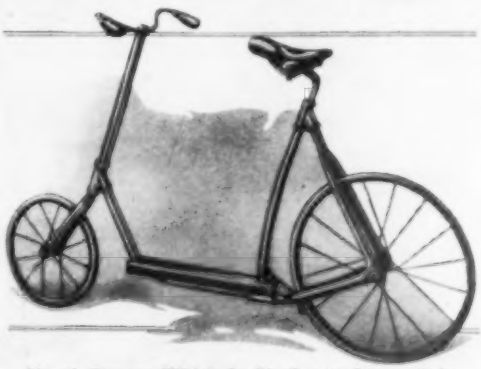
the regular army, there being stationed at the encampment a company of regular infantry, a troop of cavalry, and a battery of field artillery. The day before the encampment closed the president's personal flag, which had been brought from Washington for the purpose, was raised and saluted. This is said to be the first time in 60 years that this flag has been allowed to leave the national capital without being accompanied by the chief executive.

ALCOHOL BARRED FROM NEW TYPE OF WINE

Wine minus alcoholic ingredients has lately been brought out in the grape-raising regions of southern Europe. Ordinary wine is the basis from which the new kind is manufactured, the alcohol being drawn off by fractional distillation under relatively low pressures. All the ethers, aldehydes, and tannic acids of the original are preserved in the new product, giving it the usual pleasant taste and stimulating properties. Tannic acid in this form is believed to exercise protective action against typhus and cholera germs. The beverage is said to possess a taste quite different from grape juice, to which it might seem closely related.

EARLY BICYCLE PROTOTYPE OF NEW COASTER

One of the new coasting devices that has been introduced for children is designed much like some of the original bicycles. It is substantially constructed and is supplied with a foot brake which allows it to be controlled readily on the steepest grades. When used on the level it is propelled by pushing against the ground with one foot while the rider is either seated or standing. It is fitted with rubber tires and has a standard



Novel Coaster Which Is Similar to Some of the First Bicycles Used in America

type of saddle which may be adjusted to various heights to suit different users.

SNUG WINTER TOGS FOR THE OUTDOOR GIRL

Serviceable and Stylish Snow and Ice Outfit Made Large and Roomy: It Has Leather Collar and Cuffs, Muff Pockets below the Belt, and Slips over the Head

Glazed-Kid Coat and Engadine Skirt of Contrasting Color Form Attractive Skating Suit

Smart "Tuxedo" Skating Set Which Is Both Jaunty and Distinctive: The Heavy Woolen Scarf is Hand-Knitted with Attractive Borders That Are Available in Various Colors. The Hat, Also Hand-Knitted, Sits Down over the Head with Just a Suggestion of a Slouch

Skiing Suit Procurable in Many Colors: Coat Has an Inverted Pleat in Back; Breeches Are Full at the Knees and Have Contrasting Cuffs. Puttees, Gauntlets, and a Combination Hood and Scarf Complete the Costume

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WITH AN ABUNDANCE OF STYLE AND WARMTH

One of the Most Pleasing Winter Costumes is Made for Bob Sledding. It Consists of Leather Coat, Colored Breeches, Puttees, Kid Hat, Angora Scarf, Gloves and Boots

Reversible Sleighing Coat of Tan Spotproof Leather and Gabardine, with Hat to Match

The Catchy Skating Cap Above Is of White Knitted Material Combined with Colored Swiss Engadine. It Has an Ear Lap on the Left Side and the Scarf, Which is Attached to the Cap, Protects the Other Ear. The Sport Suit at the Left is Made of an Imported Material Which Sheds Water and Has Much Warmth

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For Coasting and Snow Shoeing There Is This Big Coat Made of Hudson-Bay Blanket in White with Contrasting Stripes. The Hood is Attached to the Coat and a Separate Scarf Worn about the Waist. It is Worn over Skiing Breeches

SEA SLED AND AEROPLANES TO COVER MAIL ROUTES

Sea-sled mail service is to be inaugurated on the Magdalena River in the Republic of Colombia between Bogota, the capital, and the coast. By the water route the distance between the two points is more than 800 miles. It is expected that it will be covered at an average speed of nearly 40 miles an hour.

Tests were recently made on the Hudson River, near New York, with an oddly designed craft which has been built especially for this service. It is a broad-beamed glider equipped with a high-power motor and driven by two aerial propellers mounted at the stern. It is capable of carrying a number of passengers, and when loaded, draws only 5 in. of water. While traveling at its maximum speed, however, the sled requires only 1 in. of water, for it skims along barely cutting the surface. Its slight draft is made necessary by the shallowness of the river on which it is to operate.

The establishment of another interesting mail service is reported from New Mexico, where airmen are to carry both mail and passengers via aeroplane between Gallup, near the border, and Ganado, Ariz. Keam's Canyon, Fort Defiance, and St. Michael are other points which will also be touched. Four flying machines will be employed, and a regular schedule maintained. This route extends across the desert and in the past has been covered by pony.

PHONES REPLACE WAITERS IN JERSEY RESTAURANT

Telephones are being used in one of the restaurants at Plainfield, N. J., as substitutes for waitresses. Instruments have been installed at each of the several tables and permit the guests to communicate their orders direct to the kitchen without suffering delay. The activities of the waitresses are confined solely to the serving of food. To simplify the system, each menu on the card is numbered so that a patron may render his order numerically. A switchboard operator makes a record of all orders and attends to the issuance of the checks. The guests are privileged to use the telephones for outside calls and likewise may re-

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Stern View of the "Yolanda II," a Peculiarly Designed Hydroplane Built in America to be Used in Carrying Mail down the Magdalena River in Colombia

Lower Photograph Gives a General Idea of the Appearance of the Odd Craft, Which, When Traveling at Its Maximum Speed, Draws Only One Inch of Water

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Instead of Waiting for a Servant to Take His Order, a Guest Communicates His Wants to the Kitchen by Telephone

ceive incoming messages without leaving their respective tables. By the inauguration of this scheme the company has been able to eliminate three-fourths of its waitresses and reduce expenses accordingly while maintaining satisfactory and novel service.

LAST OF CIVIL-WAR MEN IS MUSTERED OUT

During recent years only a few men who saw active service in the Civil War have remained with the regular army in any capacity. The last of these, in the belief of officials, has now retired. The person on whom the distinction fell of being the only remaining war veteran in the service was Maj. Gen. Wm. H. Carter, his retirement taking place in November, 1915. According to War Department records he entered the army at the age of 12 and served as mounted dispatch bearer, and in the defense of Nashville. Thus he was hardly an officer or even an enlisted man at that time. The last officer, Maj. Gen. Geo. B. Davis, retired in 1911; and later the only private of war times, John L. Clem—afterward brigadier general—left the service. Thus the going of Major General Carter marked the departure of the last man who saw service of even minor character in Civil War days.

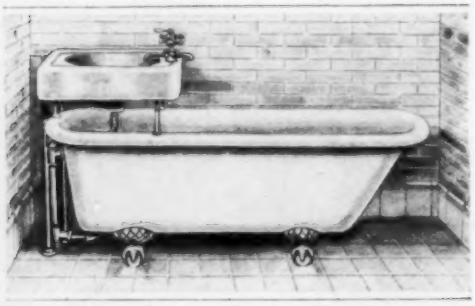
ADJUSTABLE SHOTGUN RACK FOR DUCK BOAT

Both for the safety and convenience of duck shooters, an ingenious gun rack is being made that may be applied easily to the gunwale of a canoe or skiff. It consists of an adjustable arm, with rubber-covered, "U"-shaped holders at either extremity, supported at one end of a curved bracket which is pivoted to a simple screw clamp. This may be attached or detached quickly. It is built of malleable iron, is finished in dead-grass-green enamel, and weighs 2½ lb. It may be taken apart without difficulty and packed in a suitcase or portage bag. When in use it holds a gun slightly inclined and in a convenient position for the hunter, so that he may grab it quickly when he needs it. The danger of accidentally discharging a piece and blowing a hole in the bottom of the boat is lessened considerably by using the rack.

The Rest Supports a Gun so That It may be Easily Grabbed by a Hunter

COMBINATION BATHTUB AND WASHSTAND

A combination bathtub and washstand recently brought out by a western inventor not only economizes



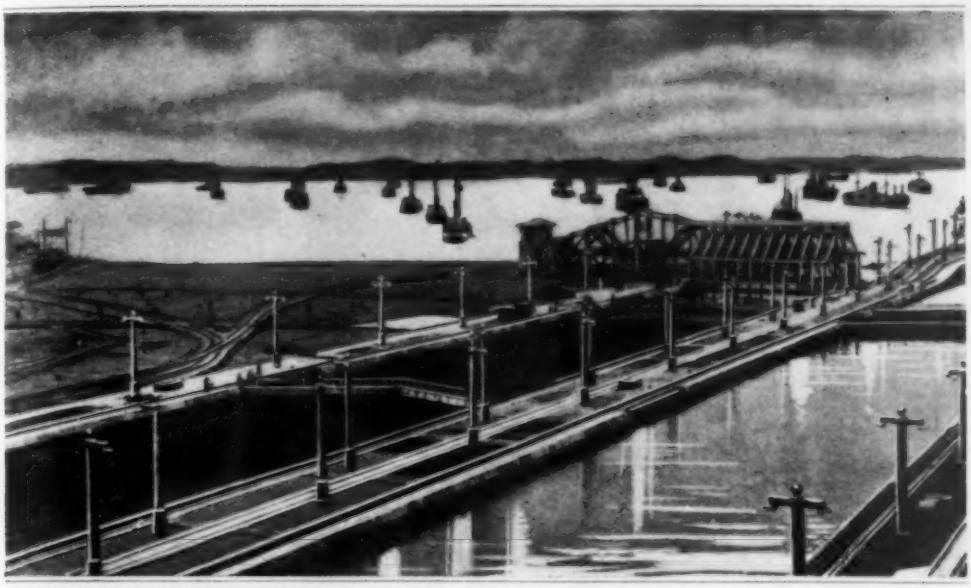
This Convenient Arrangement of Bathtub and Washstand Results in a Saving Both of Space and of Plumbing Work

space, an important feature in most city buildings, but results in a considerable saving in the cost of the plumbing work. The washstand is mounted on the "foot" of the bathtub and uses the same supply pipe and drain pipe. The position of the washstand is convenient either for a bather or for a person standing at the side of the bathtub. The washstand also furnishes a convenient handhold and eliminates much of the danger of slipping when getting into or out of the tub.

ODD OVERLAND SCHOONER USED ON WEST COAST

Several novel features are represented in a touring conveyance which is being used in promoting church-extension work on the Pacific coast. It is drawn by a light touring car which has been altered somewhat in order to make it serve as a tractor. Its chassis has been elongated and is supported at the rear on wheels driven by chains extended from the hubs of what is properly the rear axle of the machine. As may be seen by glancing at the accompanying photograph, this truck also carries the front end of the van, which is held by a swivel coupling that permits the contrivance to be steered. On the right side, at each end of what may be termed the trailer, a built-in folding bed is provided. Each of these is accessible from the inside of the van, and when folded out, is inclosed in canvas, forming an airy, comfortable bunk. The kitchen is situated at the fore end, where a gasoline stove, a sink, hot and cold running water, a cupboard, a cooling cabinet, a pantry, and a folding table are supplied. At the rear is a small dressing room and clothes closet. In the living room there is a built-in writing desk and bookcase.

Comfortable Traveling Quarters are Provided for Three Persons in This Odd Road Schooner



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MANY SHIPS BLOCKED BY STOPPAGE OF CANAL

VIEW of Gatun Lake at Panama Canal showing large fleet of merchant ships held up by the latest slide at Gold Hill in Gaillard Cut. The delivery of munitions and railway locomotives to Russia has been delayed, as have shipments of other cargoes to various ports. Coastwise traffic via the canal has likewise been suspended. The vessels shown here are awaiting the reopening of the waterway, instead of making the long trip around the Horn. Engineers believe that the passage will again be ready for traffic early in January.

FLIER LAUNCHED FROM SPEEDING VESSEL

What navy officials believe to be the most important development in the art of flying in recent years took place off the coast of Florida a short time ago. From the deck of the speeding "North Carolina," an aeroplane tender, an airman succeeded in launching his machine and soared away in successful flight. This achievement means that hereafter American battleships will be enabled to send forth scouting air craft even while proceeding under full speed, an invaluable asset in time of approaching encounter with an enemy squadron. To do the launching, the catapult arrangement described in the January, 1913, number of Popular Mechanics Magazine is employed. The aeroplane is mounted on a little car on which it is propelled down an inclined track at a speed bordering on 50 miles per hour. At the end of the rails the car suddenly stops, and the flying machine soars away under its own power.

SPIES USE NEWSPAPERS TO TRANSMIT WAR NEWS

The British postal department has discovered that spies have been using newspapers and periodicals as mediums of communication with their home governments. Whether the communicating is done by writing on margins, by crossing out words in the printed matter according to some secret system, or whether marked bits of paper have been rolled up with the news copies, is not stated. At any rate it appears to have definitely been established that important information was being sent enemy countries through the medium of newspapers forwarded by private individuals. To prevent this practice in the future, the government has ordered that the post-office department forward no papers or periodicals except those that come direct from publishing houses. Readers in foreign countries will therefore have to subscribe direct for their publications hereafter.

FRANCE'S GREAT DRIVE IN THE WESTERN THEATER

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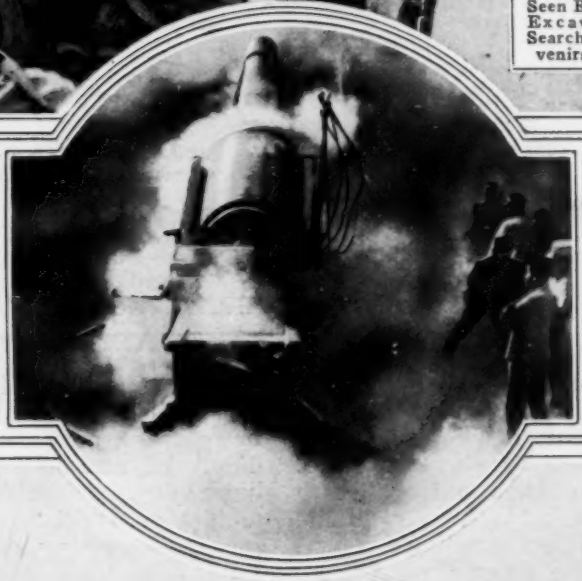
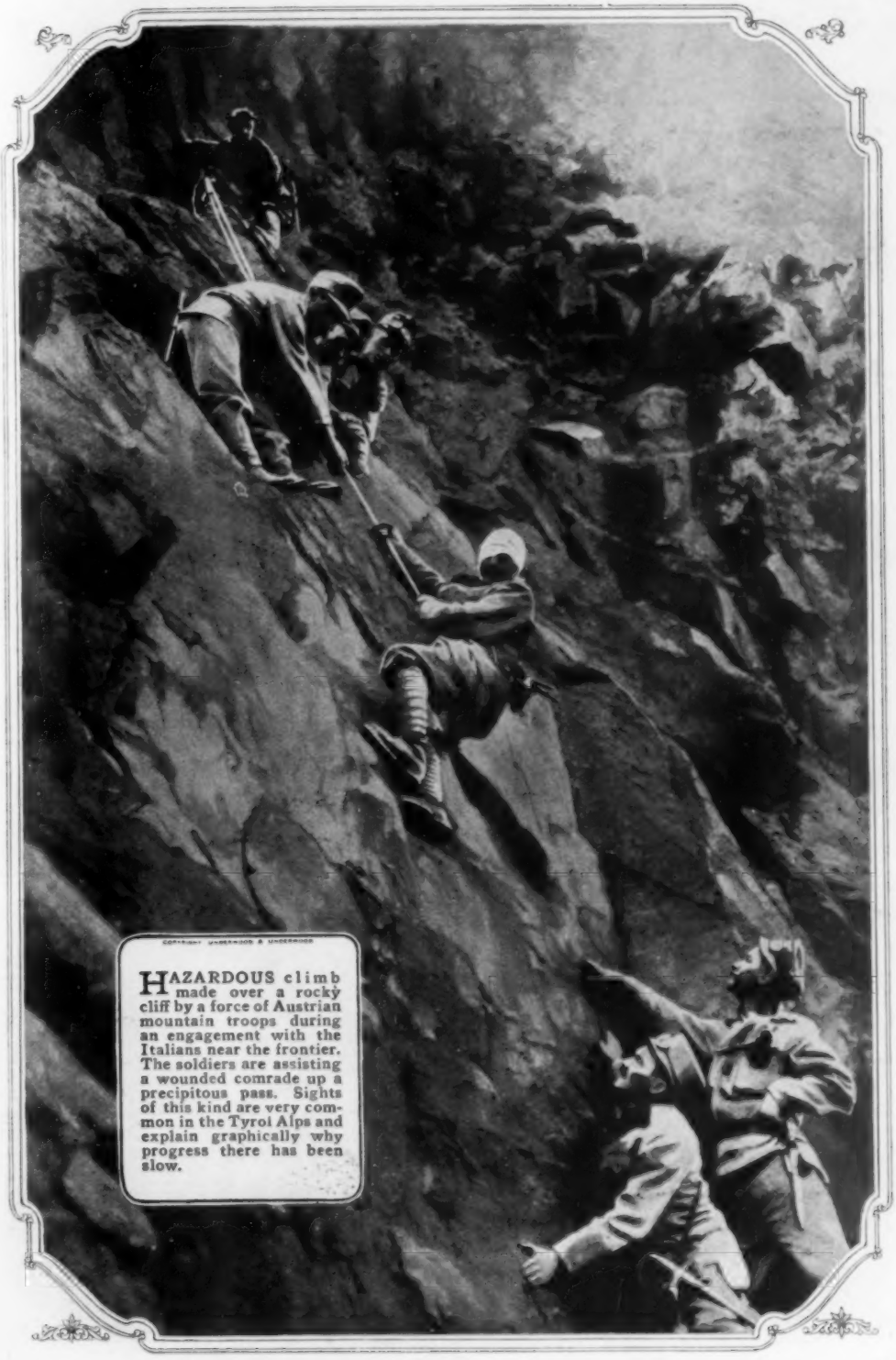
In a German Trench After the Kaiser's Forces had been Routed, Following a Long Artillery Bombardment, and the Position Captured by the French. The Soldiers are Seen Examining the Excavation and Searching for Souvenirs and Booty



Below is Given an Interesting Glimpse of One of the Zigzag Communication Trenches during the Heat of the Great Offensive: On One Side German Prisoners, Just Surrendered, are being Escorted to the Rear, While at the Right Fresh Troops are Pushing through to the Firing Line

Tens of Thousands of Shells Rained against the German Positions Before the French Commenced Their Spectacular Rush. This Pictures One of the Heavy Artillery Pieces in Action during the Protracted Bombardment Which Lasted for Many Hours

HARDSHIPS MET BY WARRING ALPINE FORCES



HAZARDOUS climb made over a rocky cliff by a force of Austrian mountain troops during an engagement with the Italians near the frontier. The soldiers are assisting a wounded comrade up a precipitous pass. Sights of this kind are very common in the Tyrol Alps and explain graphically why progress there has been slow.

INGENIOUS RUSES RESORTED TO IN WAR

Sketch Showing King Emanuel of Italy and General Joffre Watching the Progress of a Battle in the Hills

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One of the Italian Artillery's Heavy Guns Mounted on a Narrow Track in the Mountains of Tyrol. The Battery is Screened from the View of the Enemy behind a Clump of Trees

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Large Store of Ammunition at the Rear of French Artillery Batteries Concealed from Airmen beneath a Thick Covering of Branches

AND VIEWS FROM VARIOUS BATTLE CAMPS

This Panorama Gives a Very Clear Idea of the Type of Country in Which the Untrained Serbian Forces are Defending Themselves

Dummy Horse Made of Barbed Wire and Used by the Germans as a Decoy. It was Captured from a Trench by the British

Serbian Gun near the River Save Manned by Russian Artillerymen. Greenery Scattered over the Breastworks Hides the Position from View

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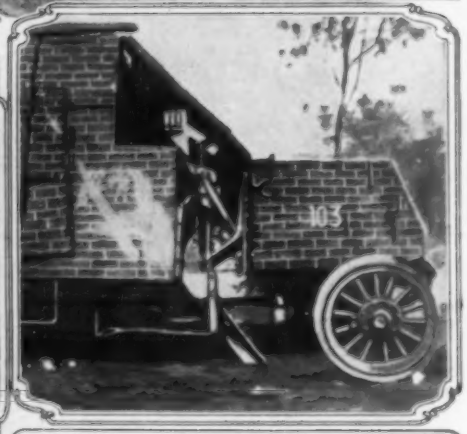
Large French Gun Surrounded by Logs and Painted to Resemble a Fallen Tree in Order to Deceive the Enemy's Aerial Scouts



This Shows an Armored Motor Car, Used by the Allies and Painted to Look Like a Small Brick Building, After It had been Discovered by German Gunners and Temporarily Disabled

MAKING BANDAGES AND DRESSINGS FOR WOUNDED

British Women Working for Queen Mary's Needlework Guild Making Cotton Swabs for Use of Army Surgeons in the Field and at Military Hospitals

Medical Corps Using Acetylene Lamps and Electric Flash Lights in Searching for Wounded in a Woods at Night

Thousands of Yards of Bandages have been Made by the Workers. Here They are Winding the Long Strips of Chemically Treated Gauze into Rolls of Convenient Size

Preparing Sawdust Dressings for the Wounded: These are being Employed Quite Extensively in Place of Absorbent Cotton and have been Found Satisfactory for General Purposes

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WAR HORSES IN BATTLE AND AT HOSPITAL BASE

Charge of an Algerian Cavalry Detachment across the Dunes in Flanders: One of the Most Picturesque Photographs Received Since the Outbreak of Hostilities

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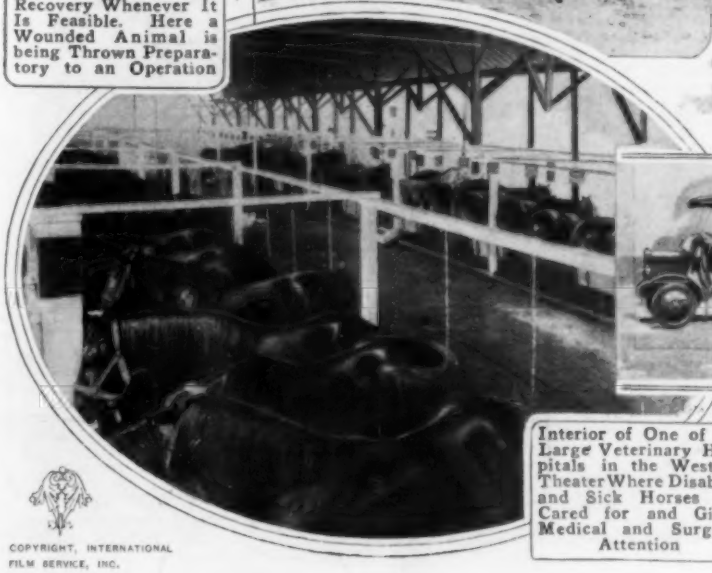
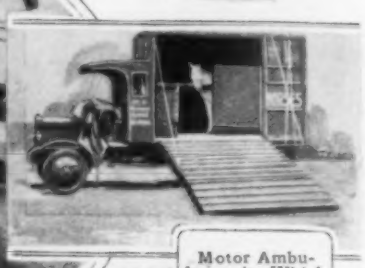
In War the Loss of a Horse Is as Costly as That of a Man, so Pains are Taken to Treat His Injuries and Aid His Recovery Whenever It Is Feasible. Here a Wounded Animal is being Thrown Preparatory to an Operation



Interior of One of the Large Veterinary Hospitals in the Western Theater Where Disabled and Sick Horses are Cared for and Given Medical and Surgical Attention



Motor Ambulance in Which Horses Wounded in Battle are Carried to Veterinary Bases for Treatment

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GERMAN BATTLE TRENCHES IN THE BUILDING

This Photograph Shows Pioneers Connected with the Engineering Corps of One of the Teutonic Armies Intrenching a Position Prior to Its Occupation by the Infantry

Carrying Reeds and Willow Poles to the Newly Dug Trench to be Used in Reinforcing Its Sides. The "Pioneers" Who Do This Work are Usually Recruited from Men Unfitted for Regular Fighting

Weaving the Springy Poles about Posts to Form a Substantial Lining for the Trench: This Goes Far in Preventing the Walls from Crumbling during Rainy Weather When the Ground becomes Watersoaked

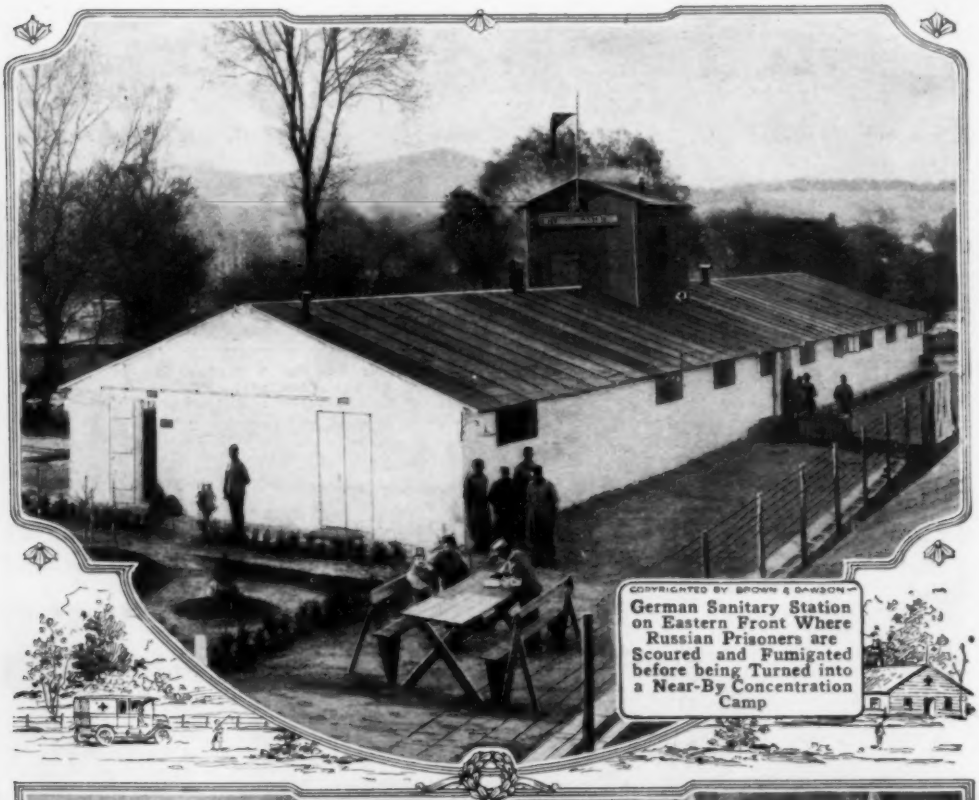
STRIKING SCENES IN DIFFERENT WAR CAMPS

Rats have Become a Menace in Many of the Trenches: Professional Catchers are Employed by the French to Exterminate Them

Carrying the Bodies of Fallen Soldiers to an Awaiting Grave behind the German Lines: The Size of This Trench Gives an Idea of the Modern Meaning of "Heavy Losses"

Some of the Spoils of War: Rifles and Artillery Ammunition Gathered by the Germans after Their Occupation of Positions Abandoned by the Russian Forces

SYSTEM AND ORDER MARK GERMAN EFFICIENCY



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German Sanitary Station on Eastern Front Where Russian Prisoners are Scoured and Fumigated before being Turned into a Near-By Concentration Camp

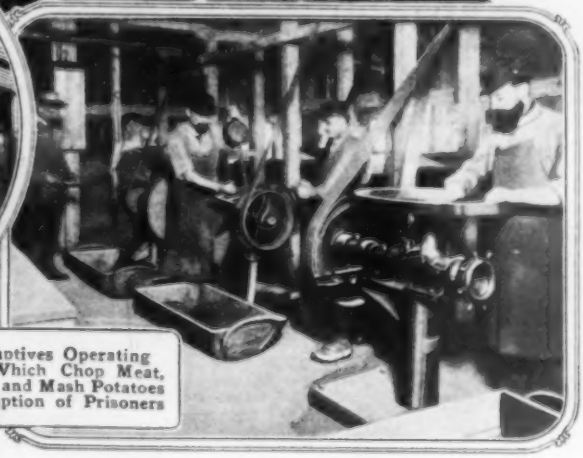
Fresh German Troops being Finally Equipped before Departing for the Front: Many of Them Wear Flowers Pinned on by Mothers and Sweethearts

EVERYDAY LIFE OF EUROPEAN WAR PRISONERS

Russian Prisoners of War, All of Them Badly Maimed, Arriving at Petrograd by Way of Sweden after being Exchanged with Germany

French Prisoners in Teuton Camp Studying the German Language under Tutelage of One of Their Comrades, a Professor of a Paris University

Tent Church with Altar and Organ in German Concentration Camp Where Protestant and Catholic Services are Held in Various Tongues



French Captives Operating Machines Which Chop Meat, Grind Peas, and Mash Potatoes for Consumption of Prisoners

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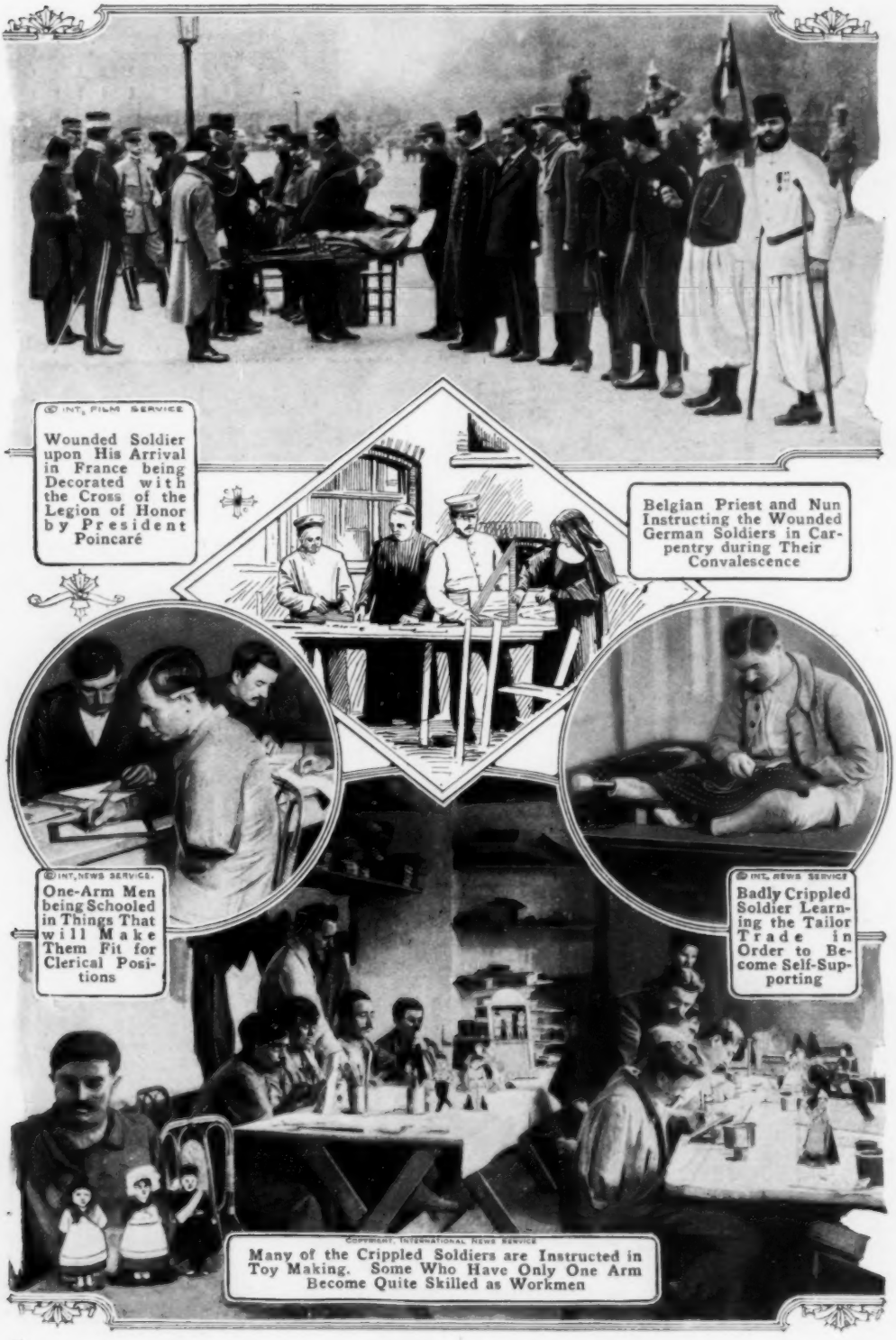
TEACHING MAIMED SOLDIERS NEW OCCUPATIONS



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Wounded Soldier upon His Arrival in France being Decorated with the Cross of the Legion of Honor by President Poincaré

Belgian Priest and Nun Instructing the Wounded German Soldiers in Carpentry during Their Convalescence

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One-Arm Men being Schooled in Things That will Make Them Fit for Clerical Positions

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Badly Crippled Soldier Learning the Tailor Trade in Order to Become Self-Supporting

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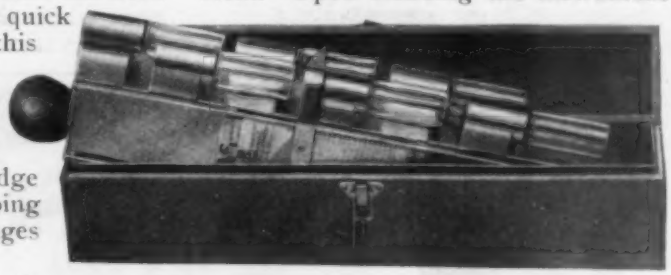
Many of the Crippled Soldiers are Instructed in Toy Making. Some Who Have Only One Arm Become Quite Skilled as Workmen

ANALYSIS OF SANDS IS MADE SIMPLER PROCESS

In erecting concrete structures the quality of the sand used is of the utmost importance. A machine has been invented which will make quick and accurate tests on this material as it is delivered load by load to the job. By this means uncertainty may be eliminated and an accurate knowledge obtained of the sand going into a structure at all stages in its erection.



New Instrument Tests Sand While Wet Instead of Dry

Unlike most existing testers, this machine works with the material in a thoroughly wet condition, rather than extremely dry. The instrument consists of a long metal box divided into compartments by screens of known and accurate mesh. A measureful of the sand to be tested is poured into one end of the box, together with enough water to bring the total height up to an indicated level. The contrivance is then given a reciprocating motion, which results in the sand percolating through the several screens and accurately sorting itself into the definite sizes represented by the individual screens. Upon turning the instrument over, the sand is run off into a series of glass bottles arranged in tubelike formation along the side of the metal box—each bottle opening directly into its own compartment. Upon standing the instrument on end, the sand settles in each container and the amount of each kind may then readily be determined by inspection. Adding together the heights of sand in each bottle gives the total amount put in, and a paper recording system is provided by which a permanent record of the heights given by the test may be made. From this it is an easy matter to figure out the percentage of each size of sand found in the original volume, and also to discover how much clay or other impurities may have been present. The instrument is readily carried about.

PADLOCK OF FREAK SHAPE HAS MANY USES

A padlock designed particularly for the use of automobilists was lately put on the market. The dominant feature of this lock is its bow. Instead of the usual semicircular form for slipping through a staple, or the like, the bow on this shackle is oval in shape and is divided at the middle into two jaws which open outward, hinge-fashion. A mechanism at the hinge, manipulated with a key, supplies the locking feature, and is capable of clamping the jaws in position whatever their degree of opening. The lock is designed particularly for securing lap robes to their supporting bars in the tonneau of an automobile. Or a suitcase may be locked to a foot-rail and the chances of its being spirited away lessened. The gasoline and spark-control levers may be clamped to the framework just beneath the steering wheel and thus unauthorized use of the car be prevented. The large size of the bow permits the padlock gripping many things beyond the range of an ordinary lock of the kind.

¶Apple growers in the vicinity of New York are planning to ship to Europe enough apples to supply one to every soldier in the trenches and the hospitals.

NEW CELERY BLEACHER MADE OF BLACK PAPER

To do away with the necessity for "earthing up" celery in order to bleach it, a bleacher consisting of a cover designed to be placed around the plant has recently been placed on the market. This bleacher is made of heavy black paper which excludes all light from the stalk. It comes in flat sheets which are simply bent around the plant and fastened with cord and buttons. The paper is waterproof and will withstand wet weather, so that with reasonable care the same bleachers can be used for several seasons.

With These Covers Placed around the Celery Plants the Stalks are Thoroughly Bleached without Resort to the Usual "Earthing Up"

SIGNIFICANCE OF X-STORMS FOUND BY RADIO EXPERTS

As a result of a comprehensive study, it has been found that the "strays," or static discharges commonly known as X-storms, which frequently interrupt radio communication are due to atmospheric conditions that bring about thunderstorms. The prevailing belief in the past has been in contradiction to this. It has been considered that X-storms were the result of thunderstorms which in due time reached the zone where the "strays" were detected.

Observations have been made at wireless stations in all parts of the world which have shown convincingly that X-storms are developed by the atmospheric conditions which subsequently result in thunderstorms. Ordinarily a day elapses after the presence of severe "strays" has been felt before lightning and rain come. The disturbances coincide with periods of low pressure, great wind velocity, radical temperature changes, and rapid barometer fluctuations. There are times when wireless instruments detect the presence of "strays" that thunderstorms do not follow. In such cases rain most always falls, however, and there are changes in temperature. The absence of electrical disturbances in such instances is said to be due to the fact that the atmospheric changes have not been of sufficient severity to produce noticeable lightning.

In the daytime, "strays" are often caused by purely local discharges which are too weak to cause lightning, but which herald the approach of unstable weather. It has also been observed that static disturbances recorded at night are more often due to non-local conditions than those occurring in the daytime.

As concrete examples of wireless apparatus offering a means of forecasting weather changes, the records of the

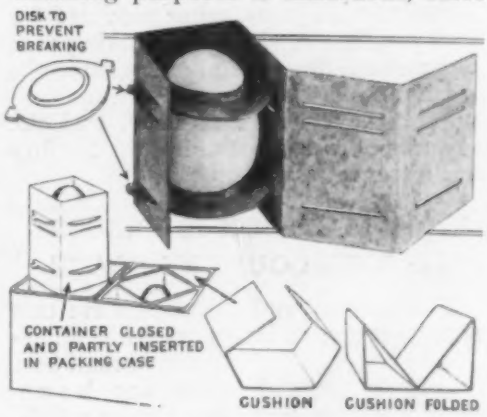
radio station at Malta show that severe "strays" prevailed on Aug. 22 and 23, 1914, while the heaviest rainfall of the month occurred on Aug. 24. Likewise during the nights of Sept. 22 and 23, of the same year, bad X-storms occurred and were followed by heavy rains.

NEW TYPE OF DOLL TEACHES CHILDREN EMBROIDERY

The liking small children have for needlework and sewing is to be satisfied in a new and interesting way with a toy lately brought out. It consists of a family of pasteboard dolls of ordinary size, and accompanied by the usual complement of brightly colored, interchangeable garments — likewise pasteboard. Outlined on each gown, or coat, or whatever it may be, is an embroidery pattern through which needle holes are punched at short intervals. Several strands of brightly colored embroidery silk and a needle are a part of the set, and with these the small lady may embroider the doll dresses to her entire satisfaction, simply by following the punched holes in the outlined design.

NEW CONTAINER FOR SAFE SHIPPING OF EGGS

The shipping of valuable eggs for hatching purposes is hazardous, since



Eggs are Safely Shipped to Destination in New Type of Cushion Container

the jars and shaking up of travel are likely to injure the fertility of the eggs, even if they do emerge from the journey with unbroken shells. A new container has appeared on the market, however, which the manufacturers claim will eliminate a large share of this danger. In the new carrier a separate com-

Outlined on the Dress at the Left Is an Embroidery Pattern: Tiny Needle Holes Punched at Intervals Allow the Child Readily to Follow the Design

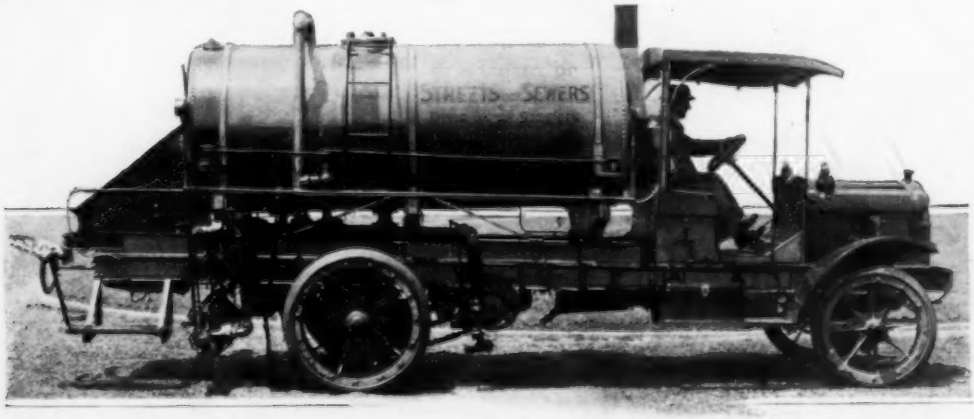
partment is provided for each egg, which is held in a fixed position within the compartment by a washer at either end. The compartments are packed into a corrugated-fiber outside box, a series of air spaces being provided for free ventilation. By thus isolating each egg and holding it firmly in position the strains upon the delicate membranes within the egg are reduced, and the chances of causing it to lose its fertility are lessened.

NEAT MAIL BOX IS ERECTED BEFORE COUNTRY PLACE

Permanency and sightliness are two of the attributes incorporated in an attractive mail box that has been erected by a Californian in front of his country home. The receptacle itself is about 18 inches square, is made entirely of copper and fitted with a small door on one side. It is supported on a substantial brick pier, approximately four feet in height, which tapers slightly toward the top. Insomuch as the residence is a brick bungalow, this type of mail receiver fits in with the general scheme nicely, besides showing a marked improvement in appearance over those devices commonly employed in our rural and suburban districts.

AUTO TRUCK CLEANS AND OILS STREETS

An auto truck that will either sprinkle, flush, or oil a street is a late addition to the equipment available for municipal roadway work. A large tank is mounted directly over the rear axle of the truck, and will hold 1,200 gal. of either oil or water. Sprinkler nozzles hang from the rear end of the chassis, while flusher pipes are just ahead of the hind wheels. At the extreme end of the car is attached a small seat for the convenience of an assistant operator. The latter controls a gasoline heating plant for warming up the tank when oil is being distributed. This second man also shifts the 16 oil nozzles to the right or left of the road as may be required. The chauffeur, besides driving the car, also controls oil and water pumps which keep the nozzles supplied. By thus combining oiling, flushing, and sprinkling functions all in one machine, and that an auto truck, street officials are now enabled to accomplish work more quickly and with much less investment in vehicles than formerly. The machines are especially useful in repair work or in the building of new roadways.



Flushing, Oiling, and Sprinkling of Streets is Readily Accomplished with New Type of Auto Truck

Coyotes Killed by One Forest Ranger in Oregon during a Winter's Shooting

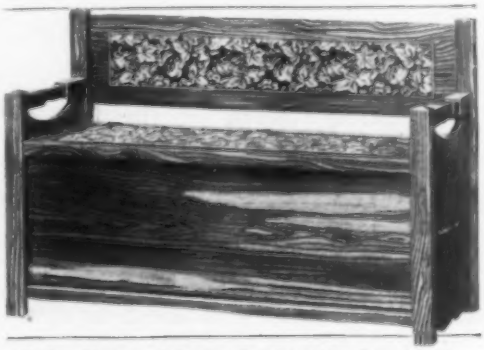
FOREST RANGER IN WINTER BECOMES HUNTER

During the winter when heavy snow in the mountains checks some of the activities of the forest ranger, he becomes a hunter. It is then his duty to devote attention to the extermination of wolves, coyotes, and other animals which prey upon cattle and sheep. Incidentally this work, besides furnishing good sport, also offers a means of increasing his income. In Oregon, for instance, a bounty of $1.50 is paid for a coyote's head. The pelt, on the other hand, is worth several dollars. So, while drawing a government salary, the ranger is also collecting bounties and disposing of skins to furriers. In some localities the season's shooting nets many trophies and brings in considerable revenue to a good hunter and trapper.

¶ Four-o'clock tea, served in the observation car, is a travel feature recently installed by a western railroad.

CAPACIOUS CEDAR CHEST MAKES NEAT SETTEE

Intended to provide a useful container for clothes as well as an artistic piece of furniture, a cedar chest made up in the form of a settee has been brought out. The utility of a cedar chest in protecting clothing and furs from moths is well known. Usually the chests are installed in front halls, or libraries, or bedrooms. By thus making them up in the form of settees



Cedar Chest and Settee Combined in One Article of Furniture

of different patterns, the clothes containers are given an artistic usefulness not otherwise obtainable. An additional feature of these chests is the style of corner joint used. Instead of the common butt joint, a mitered corner is made and held together with a special "W"-shaped wedge. The bottom is held to its place by grooves cut in the side walls. By such construction the use of screws or nails anywhere about the chests is rendered unnecessary, and warping of the boards in damp rooms prevented. The top of the chest forms a seat for the settee, and it, as well as the back, may be upholstered in tapestry or velour, if desired.

FINGER STALLS DESIGNED FOR USE OF TYPISTS

Rubber sheaths designed to be fitted over the fore part of the fingers are being made as nail and finger-tip protectors for typists. They are invented to prevent the wearing and breaking of the nails and also to keep the fingers from being stained by the frequent handling of ribbons and carbon paper. The feeling of awkwardness disappears after they have been used for a short time, it is said.

The Sheaths Save a Typist's Fingers from Ink Stains and the Nails from being Worn and Broken

¶A number of windowless and unheated cars, known as "fresh-air cars," are being run as a winter experiment on the elevated lines of Chicago.

HIGH SPEED PERMITTED ON PRIVATE BOULEVARD

Many city officials of the country are said to work a hardship on touring as well as resident motorists by passing stringent laws with regard to speed limits at which drivers may travel. Some of these limits are from 12 to 14 miles an hour, while in a few instances 25 miles an hour is permitted. The speed limits of San Fernando, Cal., range from 14 to 25 miles an hour, but squarely in the middle of the city is a private boulevard, the owners of which seem inclined to go to the other extreme, and have set the speed limit at 100 miles per hour.

This private boulevard is very wide and something like eight miles in length. It is as smooth as a table, but notwithstanding this fact, the auto drivers do not appear disposed to take advantage of the liberality of the owners by speeding. Usually they simply lean back in their seats and ramble along at an easy gait.

Owners of This Private Boulevard would Apparently Not Chafe Auto Drivers with Stringent Speed Regulations

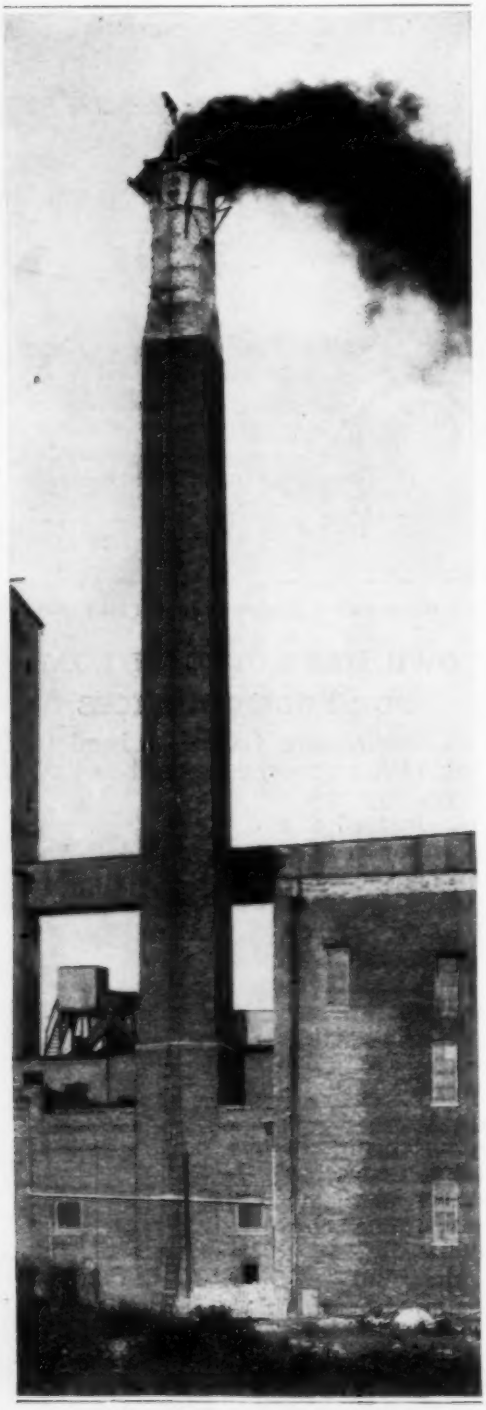
A Slight Jerk on the Trip Cord Releases the Towline and Places Each Car in the Control of Its Driver

SAFETY TOWLINE HOOK MADE FOR USE OF MOTORISTS

For lessening the chances of accident when a disabled motor car is being towed, a hook has been devised which permits a drag line to be disengaged quickly in case of an emergency. The hook is securely fastened to a rope attached to the fore axle of a crippled machine. Its two jaws grip the free end of a line extended from the tractor. These members are designed to hold firmly until released by a slight pull upon a trip cord held by the chauffeur of the car in tow. When an accident seems imminent, the two cars may thus be freed from one another, and each operator placed in control of his respective machine. If in crossing a railway track, for instance, the approach of a train is not noticed by the driver of the lead machine, the second car may be saved from a collision by pulling the trip cord and applying the brakes. The device is made in two patterns, one of which is intended to be fitted in the towline, as just described, and the other to be mounted permanently on the front axle, where it is always ready for use.

TOWN HAS BULLETIN BOARD FOR PUBLIC NOTICES

Bairdstown, a California hamlet of some 200 persons, does not boast even a country weekly. Instead of a newspaper, however, it has a public bulletin board upon which are posted articles of community interest. These notices range from "want ads" to engagement announcements, funeral items, and town proclamations. The board is 3 ft. by 4 ft. in dimension, is built in the form of a case inclosed with glass doors, and is erected on one of the streets. It was acquired only recently and affords the community its sole means of making public announcements and circulating news, except through the school and churches.



COURTESY OF ENGINEERING NEWS

Building a 30-Foot Extension to a Brick Chimney: High Winds and the Smoke Make the Work Difficult

EXTENDING CHIMNEYS IS NEW AND DANGEROUS WORK

To climb up a soot-covered, rusty ladder to the top of a tall chimney, there to work all day long amid puffs of hot gases and stifling black smoke, is not a task that the average man would envy. Added to the dirt and grime of the work is the danger of misstepping or losing one's balance. To do such work successfully requires a kind of quick thinking and sureness of foot not ordinarily met with. Yet a trade or profession which has lately arisen among bricklayers has need for just such qualities.

The new work is that of extending tall chimneys while still in service. With the expansions American factories are making, demands are continually strong for more boilers and more steam. These are generally provided, but difficulty is sometimes experienced in making the same old chimney carry off the gases from the additional new equipment. Already working up to capacity, the chimney is unable to supply sufficient draft. Building a new chimney means a large money outlay which the owners may be unable to supply. An alternative offers itself in extending the chimney already up, provided it was originally built strong enough to stand an addition.

This alternative is frequently chosen —hence the rise of the new profession. The workers climb up the narrow steps of the chimney and near the top they pass a rope around the structure to support a future scaffold. To do this they must place L-shaped, double-ended hooks over the rim of the chimney, and step in the loops at the lower ends. By advancing one hook ahead of the other, one of the workers proceeds around the chimney, carrying the rope with him. Only the narrow steel of the hook supports him in this process, and sometimes its hold among the loose bricks at the top is none too solid. Below him, 150 to 200 feet down, rise a jagged series of roofs, or perhaps the piles of scrap iron that usually accumulate in the back yards

New Gas Burner is Designed for Chafing Dishes or Light Table Use. A Griddle is Provided for Baking Cakes and Another Attachment Toasts Bread

of manufacturing plants. The wind whistles up with the dirt and grime of a factory city, and often the smoke from the stack itself curls down around the top, enveloping him in smothering, nauseous gas. Yet, somehow, through it all he gets the rope safely around. Then the scaffold with its supporting brackets is brought up and hooked on.

Afterward the process is but ordinary masonry, except for fighting of smoke and the care that has to be taken not to overstep the narrow planking of the scaffold. Upon some occasions the planking has caught fire from the smoke. Then has ensued a wild scramble for the ladder down the stack, accompanied by a mad ripping loose of the boards and a throwing of them into the stack, that they may not fall onto tar or shingled roofs below and, perhaps, start a serious conflagration. Some days the smoke is so bad that no work at all can be carried on. The furnaces cannot be stopped, for that would mean shutting down the factory, so the chimney workers necessarily have to lay off for a time, awaiting better weather conditions. Altogether it is hazardous work, but work that evolves some neatly finished chimneys.

GAS TABLE BURNER TAKES PLACE OF ALCOHOL

As a heating unit for chafing dishes, and the like, a manufacturer is putting out a gas table burner of simple construction. An attachment permits bread to be readily toasted, and a small griddle is provided for making light cakes. The burner is intended to take the place of alcohol in the chafing-dish field, and to compete with the inroads electricity is making in the same service.

TRIMMING VENEER EDGES WITH ELECTRIC SAW

In place of the old-time drawshave method, a manufacturer has put on the market a veneer trimmer operated by an electric motor. By simply sliding the little tool along the edge of the extending veneer the unnecessary material is perfectly and quickly cut away. A set-screw located on top of the planer makes adjusting for exact surface work an easy matter. The saw operates at high enough speed to prevent glue from adhering to its surface. Provision is made for the safety of the operator by surrounding all movable parts with suitable guards.

¶A soft and silky fiber, known as "malva blanca," has been discovered in Cuba, and is said to give considerable promise of being an ideal material for sugar bags. The fibers will stand close weaving, will not shrink, and are stronger than hemp, it is stated.

BOY ON ROLLER SKATES DELIVERS BALL SCORE

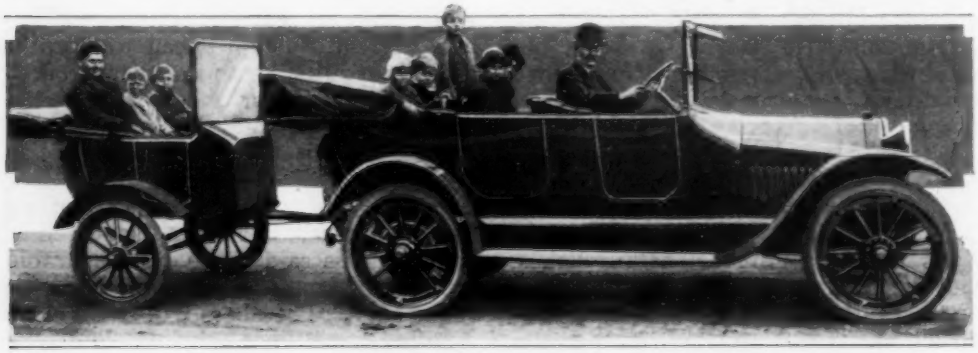
During the recent world's series a Maine shoe-manufacturing concern adopted an unusual method of keeping its employes informed as to the progress of each day's games. A board was arranged with space for the score by innings and to display the day's batteries. This was fastened to a pole and a messenger on roller skates went through the factory immediately at the close of each inning. As a result the 1,000 or more employes knew at all times how the games were progressing, and at the same time the demands that heretofore had been made on the company's telephone system to gain the same information were materially lessened.

WOULD SELL CAST-IRON CAPITOL DOME

Custodians of the state capitol building at Madison, Wis., recently had an unusual commodity for sale. The old cast-iron dome on the roof of the building had been taken down to make way for one of more modern construction. In removing the old top the various pieces were separated in such manner that they could readily be reassembled, should the purchaser desire to use them again as a dome. The pieces for sale weighed nearly 1,000 tons in total, enough to delight most any junk man's heart, should he be the purchaser.

CHILDREN RIDE TO SCHOOL IN COMBINATION AUTO

When school opened this year in a town on the Oregon coast, the man who has the contract for carrying pupils from the surrounding territory found that the population had grown so that his seven-passenger car was not large enough to handle the business. He met the emergency with a simple expedient, however. Buying a secondhand car, he had it cut in two, and the rear half rigged up as a special conveyance, complete even to the attachment of a windshield. This he coupled to the rear of his regular automobile, trailer-fashion. With this addition to his regular carrying capacity, all the children along the route could be accommodated with ease.



Children are Transported to and from School in Combination Automobile

High-Speed Gasoline Launches Used by the British as "Submarine Chasers." Each Launch Is 40 Feet Long and is So Built That a Three-Inch Rapid-Fire Gun can be Carried at the Bow. Owing to Their Shallow Draft They Are Practically Immune from Torpedo Attack

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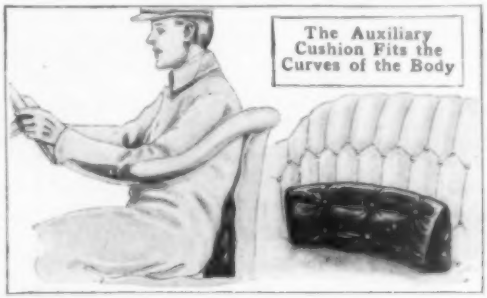
"SUBMARINE CHASERS" TO GUARD BRITISH COAST

For guarding their coasts against German submarines the British have resorted to the use of "submarine chasers," which are simply high-speed gasoline launches capable of mounting guns of 3-in. caliber. These launches are all American-built, and out of 40 for which contract was placed with a Boston firm early in the year, six are known to have been completed and shipped to England. Each launch is 40 ft. long, is equipped with a 100-hp. engine, and is built and equipped to make a speed of 28¾ miles an hour. The steering gear is like that of an automobile. Living accommodations are provided on each vessel for two or three men. The hulls are of the V-bottom type, and the motors are equipped with a special carbureting device by means of which either gasoline or heavier oils may be used. The contract price is reported as $4,000 for each of the launches. A novel feature of the launches is that each is named from some particular kind of fish.

WEDGE-SHAPE CUSHION MADE FOR MOTOR-CAR SEAT

To support the small of the back and fit the natural curve of the body, an auxiliary cushion has been designed for the chauffeur's seat in a motor car. It is 21 in. wide, 12 in. high, and 4½ in. thick at the bottom. The front side tapers to the top, where it is ½ in. thick. The cushion is filled with sea hair and covered with leather. By relieving the strain on the muscles of the back, for which the cushion is intended, a person is allowed to relax thoroughly and drive in comfort.



The Auxiliary Cushion Fits the Curves of the Body

IMMENSE CONCRETE FILLING RENEWS TREE'S VITALITY

It took six and a half tons of solid concrete to revive the waning life of a stately sugar-maple tree on the lawn

Oregon Tree Requires Concrete Column 41 Feet High as Interior Filling

of an Oregon suburban residence. The concrete was poured down inside the hollow trunk, and after setting, formed a column 41 ft. in height, 11 ft. in diameter at the base, and 4 ft. through at the top, thought to be the largest fill of the kind ever made. Since completion of the work, the tree has shown distinct signs of new life.

The column was of unusual construction. Instead of being solid and one piece from the base to the top, it was provided with numerous joints to allow for the tree's swaying with the wind. Expansion joints were also installed at convenient points to care for lengthening and shortening of the concrete with changes in temperature. As completed, the column is visible at only two points, one at the base and the other near the top. The bark and vigorous portions of the tree completely cover the remaining parts. In making ready for the concrete, the interior of the trunk was hollowed out by men with chisels, three of whom could work in the immense base at one time.

ELEVATED TRAFFIC HANDLED ON PAY-AS-YOU-ENTER PLAN

Believing present systems of handling elevated-railway crowds inefficient and wasteful of time, a Chicago inventor has proposed that overhead roads be operated on the pay-as-you-enter plan. In support of the idea it is maintained that ticket agents and platform guards could be done away with, passengers loaded and unloaded much more quickly than at present, and several thousand dollars saved the roads daily in miscellaneous expenses.

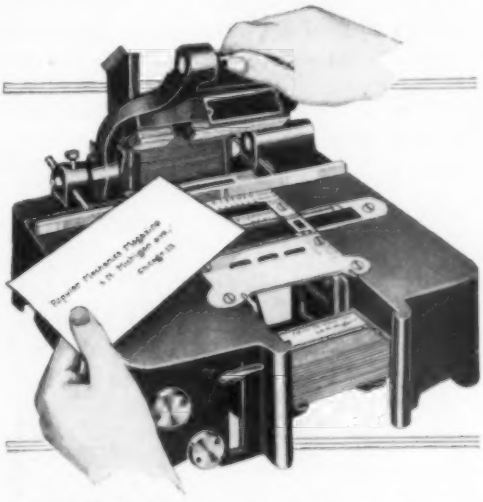
The system by which the inventor proposes to accomplish this has unusual features. All trains would consist of three cars or multiples thereof. The middle car of each three would have a door in its center for the entrance of passengers, and opposite this the conductor would stand ready to collect fares. In this the system differs radically from existing schemes, as these have agents at each station for the collection of fares, and the conductors have only to handle their trains. After passing through a turnstile in front of the fare taker in this new plan, passengers would be free to go to either end of the car or to the coach ahead or behind, these latter serving merely as extensions of the center car, and having no conductors or fare-collecting agencies. Owing to the fact that a large space is fenced off

How Platform of Elevated Road may be Easily Adapted to the Use of Proposed Pay-as-You-Enter Trains

in front of the conductor, as many as 50 passengers might enter at once, and pay their fares while the train was en route to the next station, thus effecting a material saving in time. Exits are made through doors placed as in the ordinary elevated car, the opening and closing thereof, however, being under control of the conductor. Because of the one large entrance and the many exits, it is maintained that the new plan might cut in two the time necessary for station stops. A feature emphasized in advancing the system is that small changes in existing rolling stock would be necessary, and still less in station arrangement, this latter consisting principally in readjustment of gates and fences on platforms to prevent the mixing of incoming and outgoing crowds.

HAND ADDRESSING MACHINE IS OFFICE CONVENIENCE

To fill the requirements of small offices with only moderate mailing lists, a light, hand-operated addressing machine has lately been put upon the market. Unlike the power-driven machines, this new development is only about the size of a typewriter, and the products it turns out much resemble typewritten work. Yet, for addressing, the machine is much quicker in operation and of simpler construction. Names and addresses on a company's mailing list are embossed once for all on metallic cards which are kept in an index file. When it is desired to send out letters to those on the list, the cards are taken from the file and placed in a vertical pile in the back of the machine. Pushing down on a hand lever causes one of the cards to be fed forward beneath an ordinary inked ribbon. The next blow presses the envelope down against the embossed metal plate, the intervening ribbon causing the embossing to print on the envelope. Thus one blow prints a whole address closely resembling typewritten work. The

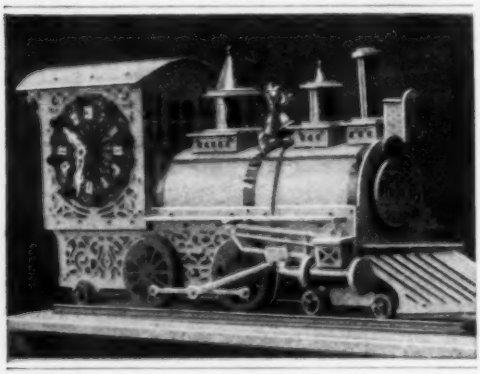


Mailing Machine Prints Whole Address in One Blow

result is naturally secured much quicker than the individual keys on a typewriter could spell out each separate word.

MODEL ENGINE IS HOUSING FOR NOVEL CLOCK

Quite a curious clock has been constructed by a Kansas mechanic in the form of a miniature locomotive. The dial, which is made of imitation ebony, is fixed on one side of the highly ornate cab of the engine and is studded with small ruby and green-colored incandescent lamps. The interior of the cab is supplied with several other tiny globes, while the headlight, which is fitted with both a reflector and lens, also mounts a lamp. A switch controlled by the clock automatically turns the current on at six o'clock in the evening and cuts it off 12 hours later. The headlight, the lamps in the cab, and those on the face of the clock are wired in separate circuits. Each of these groups is flashed independently of the others at intervals of about 15 seconds and remains lighted for a period of approximately three seconds. The clock is of standard make and of the eight-day type. It strikes on the hour and half hour by ringing the engine bell and while doing this turns the driving wheels of the locomotive, which do not touch the tiny rock-ballasted track on which they apparently rest. A manual switch at the rear of the cab provides an auxiliary control of the lamps.



The Clock Strikes by Ringing the Small Bell Mounted on the Locomotive

SHOEING SPIRITED HORSES WITHOUT DANGER

To eliminate the chance of a farrier being injured by an unruly horse or mule while performing his work, an apparatus is used which holds one foot of the animal in the right position for shoeing and at the same time prevents him from kicking. The device consists of two timber brackets securely hinged to a wall so that they may be swung out to form a temporary stall. At the outer ends the members are supported on iron standards. When a horse is led between these arms, a substantial gear is placed about his head so that he is restrained from moving it. A canvas belt is then passed beneath him, and his body is raised just enough to allow his feet to touch the floor only lightly. At the extremity of each arm, or bracket, is a mounting which receives an iron bar supplied with a leather clasp that fastens about the foot to be shod. The bar is then turned so that the beast's leg is held outstretched and in the proper position for the farrier to do his work.

With This Apparatus a Dangerous Horse may be Shod by a Farrier with Little Risk

HOW FEDERAL STRUCTURES ARE PLANNED AND BUILT

By J. CROSBY McCARTHY

WHEN buying stamps, registering a letter, obtaining a money order, or transacting other business, in a post office located in a government-owned building, few persons stop to consider just what events brought about the erection of that building; how the money which paid for it was appropriated; how its size, shape, and type of construction were decided upon, and how and by whom the site was selected. It is merely taken for granted that since it is a Federal building, it was erected by that impersonal and often misunderstood something called "the government."

In no way can a better conception of what is meant by "the government" be obtained, or a clearer insight into its activities be had, than by following the different steps which are taken from the time a movement for a Federal building is started in some town until the structure is completed and ready for occupancy. Take a building devoted exclusively to post-office uses, for instance, since there are more public buildings of this character than any other kind.

The first big step in obtaining a government-owned post office in a town is the introduction in congress of a bill authorizing its erection and appropriating a sum of money for this purpose. Citizens of the town have urged their congressman to "get them a Federal building." Or perhaps this same congressman has taken the initial step and set about it to "get a Federal building," just to show his constituents that their wants are being cared for properly. No matter who is responsible for this initial move, the congressman who is to introduce the bill authorizing the erection of the building usually makes some unofficial inquiries of the Post Office Department to ascertain the approximate amount of floor space the postal business of the town in question will necessitate, and from the supervising architect of the Treasury Department, the approximate cost of the kind of building needed. Bills authorizing post offices usually are introduced in the house of representatives, but they may also be introduced in the senate.

The movement for the new post office now has been formally launched. The bill is promptly referred to the Committee on Public Buildings and Grounds of the house or of the senate, according to the place of its introduction. This committee calls on the Post Office Department for all the information it has at hand concerning the postal conditions at the town where the Federal building is wanted, including the amount and character of the mail handled there, the total amount of postal business transacted, and the amount of floor space which should be provided, liberal allowance being made for the expected growth of the community.

From the supervising architect, the committee then obtains an estimate of the amount of money needed to erect and equip a building of the size and character needed. Upon the information thus obtained the committee bases its approval or disapproval of the bill, cutting down the appropriation which it carries if it considers the amount excessive for the kind of building contemplated. The only limitation placed on the authorization of public buildings is the requirement that those designed for post-office purposes exclusively shall not be authorized unless the postal receipts of the community have reached $10,000 a year. This provision, which was set forth in the act of March 4, 1913, has been ignored on many occasions, however. In fact, the bill of which it was a part carried appropriations for about 40 post offices to be erected in towns where the annual receipts were well below the $10,000 mark. The population of a community has little or no bearing on determining the size of a post office to

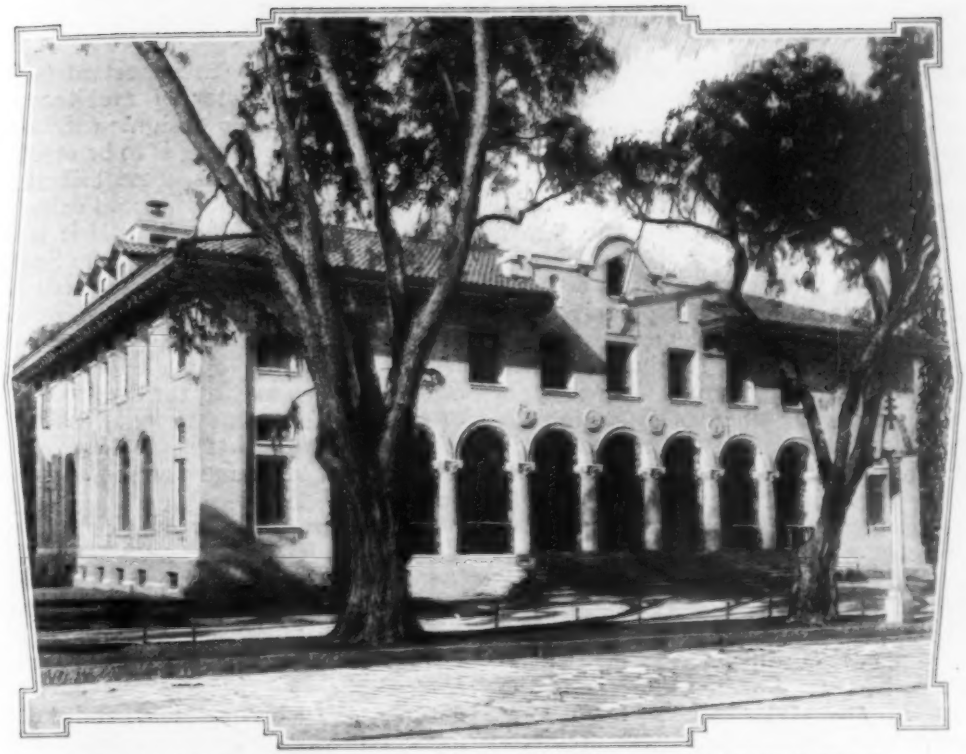
be erected there. The cost of a government-owned building in towns between 500 and 5,000 population has ranged from $40,000 to $150,000. The postal receipts in many of these offices are insufficient to pay for heat, light, water, and janitor service after they are erected.

When a bill authorizing an appropriation for a post office receives a favorable report from the Committee on Public Buildings and Grounds it is usually included with a number of like items in what is known as an "omnibus bill," and it is in that form that it is enacted into law by congress. For several years the annual appropriation for Federal buildings has been in the neighborhood of $12,000,000. The appropriation for the maintenance of these structures has been around $6,000,000.

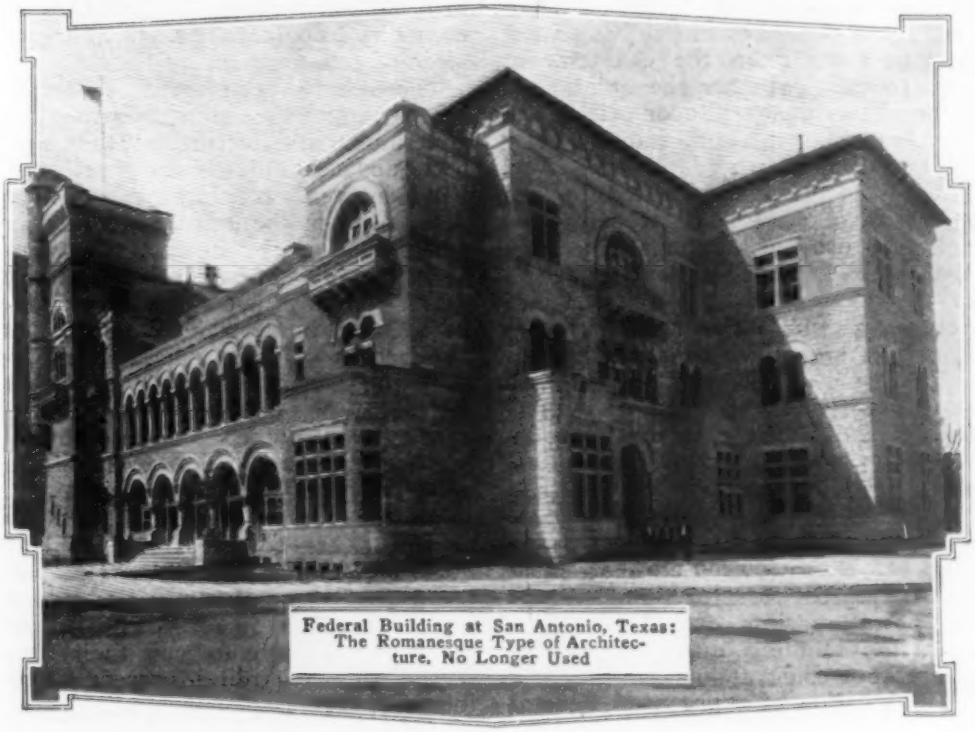
The bill having received the signature of the president, the Treasury Department in due course of time advertises for a site for the proposed structure. A special employe of the department, known as a site agent, is sent to the town to examine the sites offered, which, as a general rule, are quite numerous. To the assistant secretary of the treasury, who is in charge of the office of the supervising architect, the site agent then reports what he considers the best site and what he believes to be a fair price for the property. Negotiations for the purchase of the ground then are conducted.

The next step is the making of tentative floor-plan sketches which are based upon data concerning postal conditions at the town in which the building is to be erected. The sketches are forwarded to the Post Office Department, where they are passed upon by the committee on Federal buildings, of which the chief post-office inspector is chairman. The committee may order changes in the arrangement of rooms, location of doors and stairways, and other details. Finished drawings are then made and submitted to the postmaster-general for his approval. In cases where the building is not to be utilized exclusively for post-office purposes, but is to house other Federal offices, these plans also must be approved by the secretaries of the departments which are allotted space. For instance, if in addition to a post office, the building is to contain provisions for Federal courts, army or navy recruiting offices, the office of an observer of the weather bureau, offices for customs and public-health service employes, the plans must be approved by the secretaries of the Post Office, Justice, Army, Navy, Agriculture, and Treasury departments. It is not often that as many Federal offices as this are housed in one building, but post offices and Federal courts are frequently provided for in one structure. Whenever an appropriation for a Federal building is made and it is not definitely stated that the money is to be used solely for post-office purposes, the heads of the several departments are notified before the preliminary sketches are made, and they are requested to state if they desire to have space allotted to their respective branches, and if so, how much.

The final plans having received the necessary approval, working drawings then are prepared. Specifications for the building are written and advertisements for bids are inserted in the newspapers in the town where the building is to be erected, and also in building-trade journals. The advertisements state that sealed proposals for the work shall be delivered to the Treasury Department to be opened in public at a specified hour on a certain day. Bidders generally are given from 30 to 45 days from the time of the publication of the advertisement in which to compile their estimates and send in their proposals. The low bidder receives the contract, providing it is not believed that it will be more advantageous to the government to accept one of the other bids. The recipient of the contract is required to give a bond insuring the fulfillment and the proper completion of the work. The supervising architect sees that the contractor receives an ample supply of blueprints of plans and working draw-



The Spanish Type of Architecture in Government Buildings: A Good Example Shown in the Post Office at Riverside, California



Federal Building at San Antonio, Texas: The Romanesque Type of Architecture, No Longer Used

ings for the use of his workmen. As soon as work on the building is ready to start, a member of the field force of the supervising architect's office is detailed as superintendent of construction, and it is his duty to see that the contract specifications are followed. When the building is completed a traveling inspector is detailed to examine it. If his report is satisfactory, the final settlement with the contractor is made. The building then is ready for occupancy.

There are no set rules governing the types of architecture to be followed in designing public buildings. But this does not mean that any style is apt to be adopted. For some years past the office of the supervising architect has adhered to a policy of eliminating the ornate in public buildings and of following only those designs which are considered appropriate for such structures. The Romanesque and the Gothic are styles which have long since been discarded, and the architecture of Federal buildings these days is for the most part along classic lines.

The size of the appropriation available for the work of course has an important bearing on the character of construction—whether the building is to be of marble, granite, or brick—and in this manner it has an indirect bearing on the design to be followed. Few frame structures are erected by the government these days, it being the policy to provide buildings of a more lasting character. Quarters for officers of the United States Public Health Service, at quarantine stations, occasionally are of frame construction.

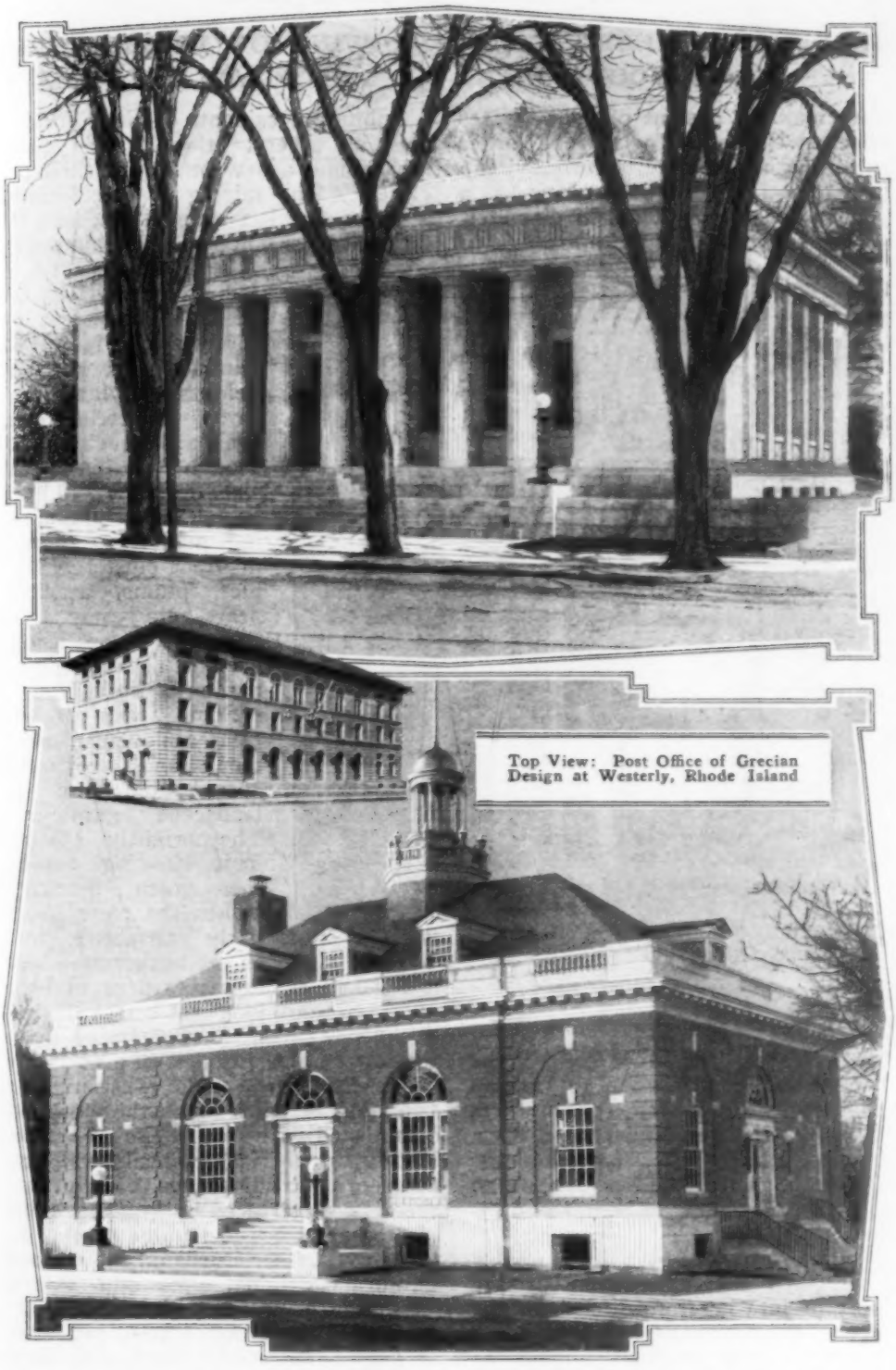
There are few regulations in force as to fireproof construction of Federal buildings. In the case of those devoted to post offices where the annual postal receipts are not greater than $15,000, only the first floor is made fireproof. Where the receipts range from $15,000 to $60,000 all floors must be of fireproof construction. Where the postal receipts exceed $60,000 a year, the building must be entirely of fireproof construction.

The location of a proposed Federal building often has an important bearing on the character of architecture which is followed in designing it. For instance, if the building is to be erected in a town which has some historical significance, the New England colonial type is apt to be followed. If it is to be erected in the Southwest, the Spanish type perhaps will be selected as being the most appropriate. Grecian architecture may be followed in a college or university town. The location of the site also may affect the selection of the design, for an effort is made to erect buildings that will harmonize with their surroundings as far as possible.

Standardization is practiced to a slight extent in designing Federal buildings in connection with such details as handrails, window fittings, lattice work, partitions, etc. The supervising architect's office has learned from experience the most satisfactory designs for such equipment, and building specifications are prepared accordingly. In order to facilitate things, working drawings of these details are kept on hand so that it will not be necessary to prepare new ones for each piece of construction.

There have been many efforts to bring about the standardization of government architecture, but they have been unsuccessful for the most part. In recent years considerable work has been saved in the preparation of floor plans, however, by utilizing the plans of buildings of like character and size which already have been erected. Since the interior arrangement of scores of small post offices is practically the same, much time and labor can be saved in this manner.

There are now more than 500 building operations on the program of the office of the supervising architect. With the present force it will take several years to prepare the plans necessary for these projects. This will mean that many communities which are in need of increased post-office facilities will have to wait their turn if the rule regarding precedence is followed.



Top View: Post Office of Grecian Design at Westerly, Rhode Island

Lower View: The Centerville, Iowa, Post Office; the New England Colonial Type of Building.
Insert: Federal Building at Phoenix, Arizona; Italian Style of Architecture

OLD WATER WHEEL STILL SAWS WOOD

A creaking, ancient overshot water wheel is employed by a woodworker in St. Augustine, Fla., to turn a group of saws and planers. The wheel has a wooden axle some 10 in. in diameter, and the buckets on the rim are 4 ft. in length. The total diameter of the wheel is about 16 feet. Two artesian wells supply the water; one of them is 6 in. in diameter and 300 ft. deep, while the other is 8 in. across and 600 ft. to the bottom. The wheel is said to supply on an average about 10 horsepower.

Aged Water Wheel Supplies Southern Woodworking Plant with Power

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¶Owing to the exhaustion of the supply of jute heretofore used for the purpose, the Germans are now using silk and velvet in making sandbags for the trenches in Belgium.

GROWING OF DWARF TREES IS PROFITABLE PASTIME

Suburban residents of New York as well as several other eastern cities have found a new outlet for their energies in the raising of dwarf trees. The practice has claimed so much interested attention of late as almost to take on the aspect of a fad. A peculiarity of these dwarf trees is that they may be trimmed and kept at heights varying from three to eight feet, even at maturity. Although of this small size, the trees will bear copiously, fruit hanging on the short limbs in great clusters. Apples, plums, peaches, pears, etc., may thus be grown in profusion, even if space for a garden is limited.

Some types of the trees make neat ornaments, and have found considerable use in landscape gardening. The brightly colored fruit hanging among the green branches makes the trees peculiarly attractive and as a background for flower gardens, and the like, their use is extending. Because of the low height, all parts of a tree may be reached with little exertion, and trimming or spraying is therefore accomplished with ease. The trees take readily to spherical, conical, oval, and other ornamental shapes. Many new species are produced by grafting twigs of ordinary trees to stunted stock. In this way, Luther Burbank, the famous California originator of odd plants, has produced a dwarf pear simply by grafting a small limb from a pear tree to quince-tree stock, the latter being naturally of dwarf size.

Cutting Weeds on a Railroad with Gasoline Power Instead of Slow-Going Scythes

RAILROAD USES GASOLINE POWER TO MOW WEEDS

A mowing machine of unusual construction found employment among railroads during the past summer. Mounted on a small flat car was a gasoline engine, and on either side hung cutting bars for slicing off the weeds which flourish on railroad embankments. The engine was geared both to the car and to the cutting machinery, causing the whole contrivance to proceed along the track at two to three miles an hour, slashing the weeds as it went. In this way the three operators of the car could accomplish more work in a day than whole gangs of section men equipped with the usual scythe.

TINY ELECTRIC RANGE MADE AS TOY FOR CHILDREN

Children may use with safety a miniature electric range which has lately been introduced. The stove is 15 in. in height, has a cooking surface, 8 in. by 11¼ in. in size, and an oven, 4½ in. wide, 2½ in. high, and 5 in. deep. Although it is purely a toy, it is at the same time a real range, for diminutive dishes may be prepared upon it with quite the same results as if a standard stove were used. The oven bakes cakes of fairy size, tiny loaves of bread, and very small pies. In design, the device is similar to many standard kitchen ranges. It is supplied with six burners and a complete set of tiny cooking utensils, while a cook-book, written expressly for young children, is also furnished. The range is intended to be connected with a lighting socket, and when in use consumes less energy than an electric flatiron. With it a cautious child may

play "house" and cook to its heart's content without danger of setting either itself or a residence afire.

CONCRETE WORK TAUGHT SCHOOL CHILDREN

The spectacle of boys, eight or ten years old, making concrete fence posts, flowerpots, urns, pedestals, garden

Boys Make Fencing, Garden Seats, and Many Other Concrete Articles at School

seats, and even cement walks, would appear rather unusual, especially as a part of a school curriculum. But courses in such work were recently introduced in the schools of a western city, and have proven quite popular. In more advanced schools boys of greater age have been given similar courses, but local authorities believed that the many boys who will not go to college, or even to high school, should have a working knowledge of a building material so universally used. The youths seem to enjoy the work and have turned out many articles of use at home and in school.

MAKESHIFT APPLIANCES REMOVE RUST QUICKLY

After the waters from recent Galveston floods had subsided, local hardware dealers found themselves in sore need of apparatus to remove rust from stoves, cutlery, and other articles rendered more or less worthless by submersion and resulting dampness. Many interesting expedients were hit upon to remedy the rusted condition. To get the marks off smaller articles a homemade sand blast was employed. This consisted of a gasoline engine, an air pump, a sand tank, and a rubber hose having a nozzle at its outer end. The sand box was so placed that a thin stream constantly trickled into the nozzle. There the fine particles were struck by a powerful current from the compressed-air tank and thrown with great force against the rusted places on the articles being cleaned. In most cases this resulted in not only the blemishes being removed, but in the metals receiving a polish as well. The edged tools could not be cleaned by a sand blast, because of the necessity for resharpening. For these a steel brush, revolved at high speed by an electric motor, was employed. Tangles of rusty nails were made almost new by throwing them into a concrete mixer, from which they emerged separated and almost as good as new.

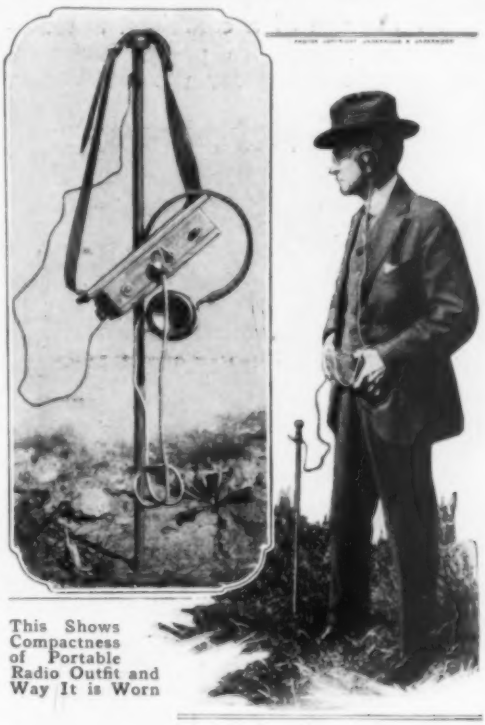
PORTABLE RADIO EQUIPMENT CARRIED ON BELT

Messages have been satisfactorily transmitted short distances by means of a very compact and portable radio apparatus which has lately been demonstrated by an inventor at Bedford Hills, N. Y. The outfit is made to be

strapped about the waist and permits an exchange of signals between operators, at least one of whom may be walking at the time. It is believed by its designer to be particularly adapted for military purposes. There is also a possibility that it will be given a chance to show its worth in this capacity on the European battle fields.

The technical details of its construction have not been made public. In a rough way, however, its general arrangement is known. The sending equipment is contained in an oblong case secured to a belt. Electric energy is provided by five dry cells. A vibrator and transformer are provided. Aerials of the form commonly known are not employed. An uninsulated wire, however, four or five feet in length, extends out of the box and is connected with a canelike metal rod. For military purposes this wire would extend down a trouser leg of an operator and be connected with a metal spur fixed in one of his boots. It serves as an antenna from which impulses are radiated.

The receiving apparatus consists of a drum encircled by a wire coil. On top of the former is a detector. A telephonic headgear is worn. During the course of experiments conducted with the apparatus on an island off the coast of Florida, it is said that messages were transmitted for a distance of approximately 18 miles. The practical working radius of the equipment, however, is expected to be about two or three miles.



This Shows Compactness of Portable Radio Outfit and Way It is Worn

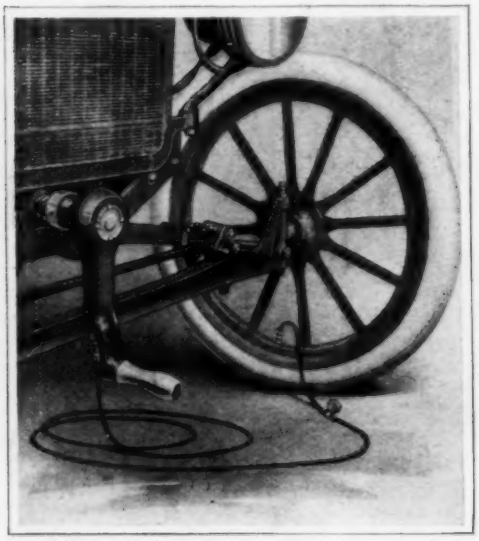
TWO-PASSENGER TRAILER FOR MOTOR CAR

In order to provide additional seating capacity for his motor car, an Iowan has constructed a two-wheeled trailer which he employs when he desires to carry more passengers than the machine will comfortably seat. This trailer is provided with a steel chassis and is attached to its tractor by means of a tongue that bolts to a crossbar fastened to the rear springs of the automobile. It is also provided with a windshield which screens its occupants from any dust that may be thrown back by the wheels in front. Two persons may be seated comfortably.

Homemade Trailer for Motor Car is Capable of Seating Two Persons

COMBINED CRANK AND TIRE PUMP FOR AUTOMOBILES

By the use of a combined automobile crank and tire pump, which is easily substituted for the crank that

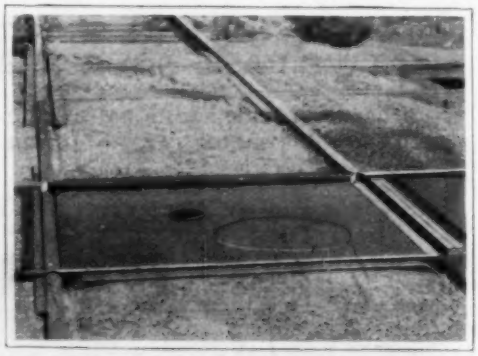


With This Combined Crank and Tire Pump the Power of the Engine is Used for Inflating the Tires

comes with the car, the work of inflating the tires is done with power from the engine. The pump is inside the crank, and to connect it with the drive shaft of the engine requires only the turning of a milled nut mounted on the shaft of the crank, the hose for conveying the air to the tires being attached to a threaded connection at the handle end of the crank. After the tires have been inflated, the pump is released from the drive shaft simply by turning the nut back to its original position, when the crank is ready to be used as a starting crank.

SHOCK ELIMINATED IN NEW RAILWAY CROSSING

The greatest objection to the rigid railway crossing of the present type is the hammer blow that results each time a wheel passes over a flangeway, and with the idea of eliminating this blow a number of shockless, or continuous-rail, crossings have been invented. One of these crossings of an original type has been in service near Los Angeles at the intersection of a busy electric line and a steam railway for six months, and is said to have proved remarkably satisfactory under the severe test to which it has been subjected in this location. The four rails that form the crossing proper work in vertical guides, and are so arranged and connected that when the pair constituting one track is down and out of the way of the wheel flanges, the pair constituting the other track is raised and in position to take the wheels of a train. The ends of the movable rails are mitered to form interlocking joints, thus providing for continuous support of the wheels while they are passing over the crossing. The vertical motion, which amounts to about 1¾ in., is imparted by two wedges, one at each end of the rail, the rails being securely supported by the wedges when in the raised position. The rails and wedges are so connected that when the wedges are withdrawn they draw the rails down. The operating mechanism, which is inclosed in the foundation, consists of gears, links, and wedges, operated by a shaft, and all having a slow motion and ample wearing surfaces. The crossing may



When One Pair of Rails in This Railway Crossing is Raised the Other Pair Is in Lowered Position and Out of the Way of the Wheel Flanges

be operated by hand or by electrical contact by an approaching train, but is particularly intended for operation by a small electric motor controlled from an interlocking tower.

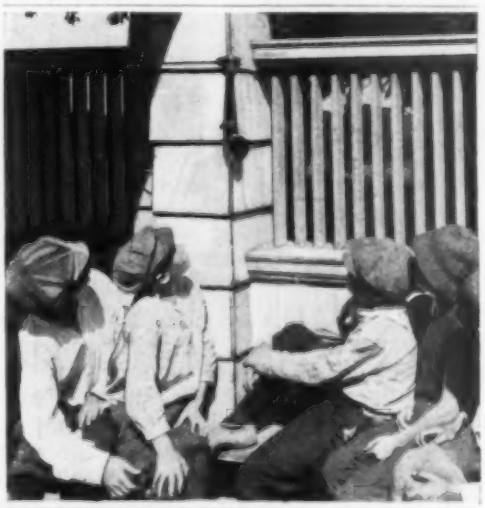
Cutting Prize Hay on the Roof of an Indian's Cabin

INDIAN GROWS PRIZE HAY ON ROOF OF HIS HOUSE

At a western Montana fair which recently closed, a prize was offered for the best wild timothy displayed with agricultural products. When the award was made it was discovered that the winning sheaf had been cut from the sod roof of a cabin belonging to a full-blooded Flathead Indian. The fair secretary noticed the rank growth and induced the Indian to make the entry.

LOUD-SPEAKING TELEPHONES USED AT COUNTRY CLUB

At one of the country clubs near Los Angeles, Cal., a loud-speaking telephone system has been installed and is employed in summoning caddies from their pavilion, which is situated some rods away. Formerly the caller used a megaphone and was frequently unable to make his voice heard when the wind was blowing against him. With the electric instrument at hand, however, he is able to speak in a normal tone and be distinctly understood, so that trouble is obviated and his orders are carried out with dispatch. The same system is also used in paging club members and announcing the progress of golf matches.



Loud-Speaking Telephone Used in Calling Caddies from Their Pavilion at a Western Country Club

NEW WRENCH IS DESIGNED TO GRIP WITH GREAT FORCE

A pipe and nut wrench of unusual construction has appeared on the market of late. Unlike the common "monkey" wrench, this new device does not depend upon the twisting of a knurled nut for adjustment. Instead it is more or less automatic in action, the shifting back and forth of the handle opening and closing the jaws. A system of compound levers permits this action and provides the arrangement which causes the jaws to exert considerable force upon the pipe or other object being turned.

DEBUT OF ANKLE BOUQUET AS FEMININE ORNAMENT

Feminine ideas of personal adornment change with the evolution of dress. So, richly embroidered hosiery became the vogue when slit skirts were in style. This season's modes in evening gowns and dancing frocks permit a conspicuous display of the ankles and therefore fashion assents to their decoration. One of the numerous attempts at this is to be found in the ankle bouquet, a freakish stab at ornamentation that has found certain exponents in the smart sets of both the East and middle West. The ankle bouquet is worn with dancing frocks and is held in place with either a narrow filigree band or a soft ribbon. It must be of dainty proportion and consist of flowers with delicate tints which harmonize with the costume worn. One may be used immediately above each ankle, or on only one limb, as best suits the taste of the individual.

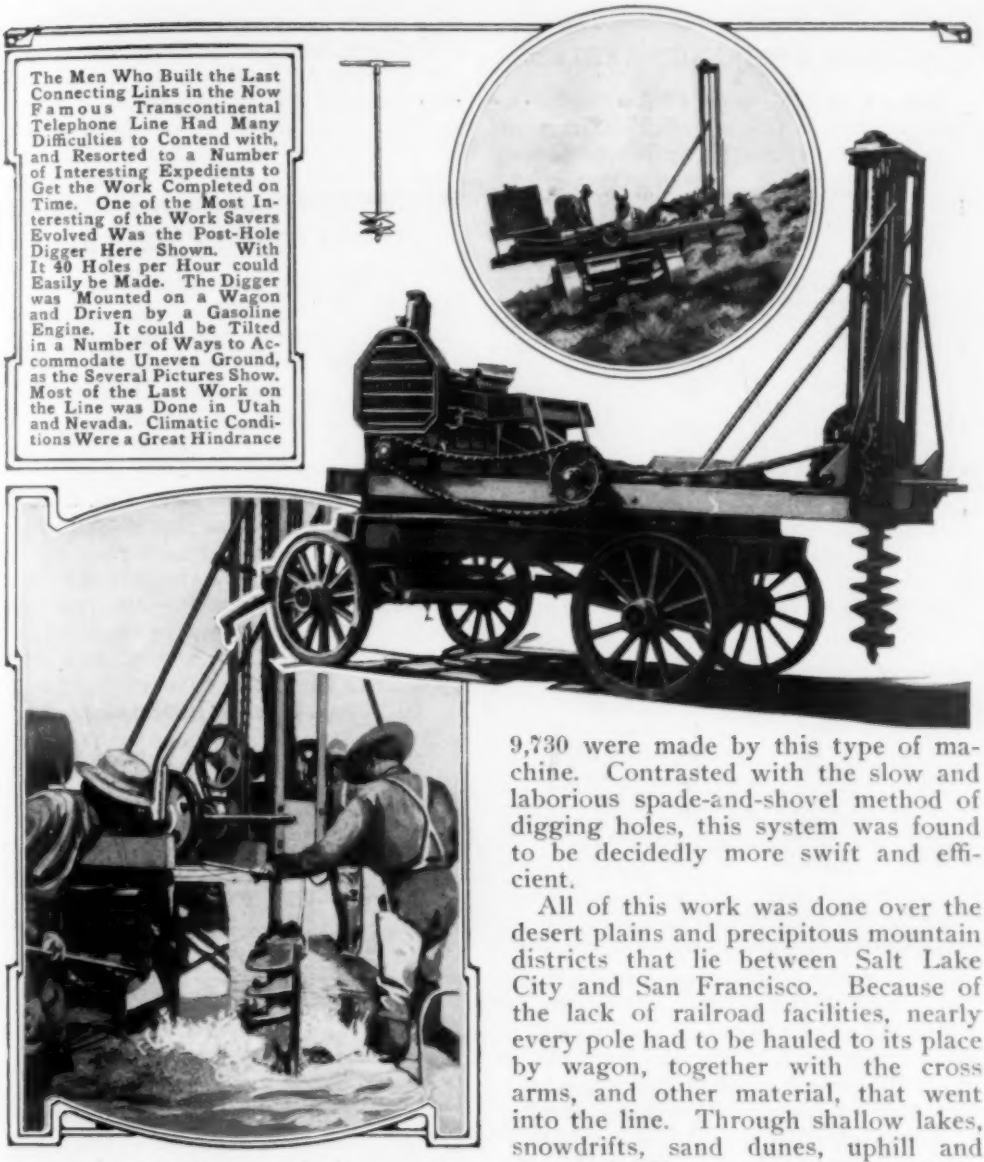
TREE PRUNING ERADICATES INSECT PESTS

To rid orchards of the brown-tail moth, entomologists have suggested that all cobwebs, and such, be cut out of fruit trees in the fall and winter, for by so doing large numbers of the insects will be destroyed while in the caterpillar stage. Brown-tail moths are said to feed especially on apple, pear, cherry, oak, and willow trees, while hickory, ash, pine, and other coniferous trees, are avoided. Thus if the aged and rotten of the former group of trees are kept continually cleared off, together with superfluous brushwood that accumulates, one feeding ground for the pests will have been eliminated. Another pest, the gypsy moth, is found in the egg stage in the winter, and much can be done in the way of reducing next year's crop of the troublesome insects if the eggs and their hiding places are painted over with creosote whenever found. The creosote effectually prevents the eggs from hatching.

QUICK WORK OF TELEPHONE GANG AIDED BY MACHINE

During construction operations on the transcontinental telephone line completed only a short time ago, a number of unusual records for fast work were made. One of these was that of the pole gang which had the task of digging some 13,900 holes and setting as many poles near the western end of the route.

Of material aid in this work was a digging machine remodeled and rigged up on the job. It consisted principally of a huge auger mounted on a frame on the back end of a wagon in such manner that it could be swung around



The Men Who Built the Last Connecting Links in the Now Famous Transcontinental Telephone Line Had Many Difficulties to Contend with, and Resorted to a Number of Interesting Expedients to Get the Work Completed on Time. One of the Most Interesting of the Work Savers Evolved Was the Post-Hole Digger Here Shown. With It 40 Holes per Hour could Easily be Made. The Digger was Mounted on a Wagon and Driven by a Gasoline Engine. It could be Tilted in a Number of Ways to Accommodate Uneven Ground, as the Several Pictures Show. Most of the Last Work on the Line was Done in Utah and Nevada. Climatic Conditions Were a Great Hindrance

and always be kept vertical, no matter what sort of ruts or gullies the several wheels of the wagon might be in. Propelling this auger was a gasoline engine mounted on the same frame. So equipped, the machine was found capable of digging a hole 16 in. in diameter and 4½ ft. deep in less than one minute. In some cases 40 holes per hour were dug, including 150-ft. removals from one hole to the next. Of the total 13,900 holes to be excavated, 9,730 were made by this type of machine. Contrasted with the slow and laborious spade-and-shovel method of digging holes, this system was found to be decidedly more swift and efficient.

All of this work was done over the desert plains and precipitous mountain districts that lie between Salt Lake City and San Francisco. Because of the lack of railroad facilities, nearly every pole had to be hauled to its place by wagon, together with the cross arms, and other material, that went into the line. Through shallow lakes, snowdrifts, sand dunes, uphill and down, the line went, always straight and ever headed toward a definite goal. Everything from blizzards to the baking heat of the desert was encountered by the men in the work, yet in spite of all difficulties the task was completed with remarkably few delays. Four automobile trucks, two hole-digging machines, three runabouts, 34 wagons, 116 horses, and one tractor of the caterpillar type were required in carrying on the work.

TELEPHONES AID IN RAPID ACTION OF CREDIT SYSTEM

As a useful adjunct to the credit department of large retail stores, an American manufacturer is marketing an electrical system which is said to be very rapid in action. When a customer buys something over the counter which he desires charged, the clerk telephones to the credit department for permission to accept such an order. The authorizing clerk at the credit department looks up the customer's rating in a card index conveniently at hand, and if the rating is satisfactory he calls to the inquiring salesman that he is ready to O. K. the order. This he does by pressing on a button which operates a stamping machine located at the salesman's side. The machinery is so arranged that it is impossible for the authorizing clerk to operate the stamping machine unless the order to be charged is in place, ready to be stamped. Among the advantages claimed for the system are quickness of service, both on account of the fact that an order slip does not have to leave the department to be authorized, and because telephone service is naturally more rapid than any other system; the credit office is in immediate and direct communication with all departments, and can answer miscellaneous questions readily; and the generally quickened service leaves better satisfied customers.

Stamping Machine and the Telephone a Clerk Uses to Call Up Credit Department: The Lower Dial on the Machine Selects the Particular Operator Desired

SOCIETY EDUCATING PUBLIC TO USE STREET CROSSING

In furthering a campaign to reduce the number of fatalities and serious accidents occurring in the thoroughfares of Gotham, attempts are being made to impress upon pedestrians the advisability of crossing streets only at their regular intersections. A large sign has been suspended above Fifth Avenue at Forty-Second Street by the Safety-First Society of New York admonishing the public against attempting to make a crossing in the middle of a block. In addition to this the two words, "Cross Here," have been painted in red letters on the curb lines at each of the four corners of the intersection. Lanes have also been marked off across the pavement for the guidance of pedestrians, and in these paths red footprints have been painted.

How the Society Urges Pedestrians against Unnecessary Carelessness in Crossing Busy Thoroughfares

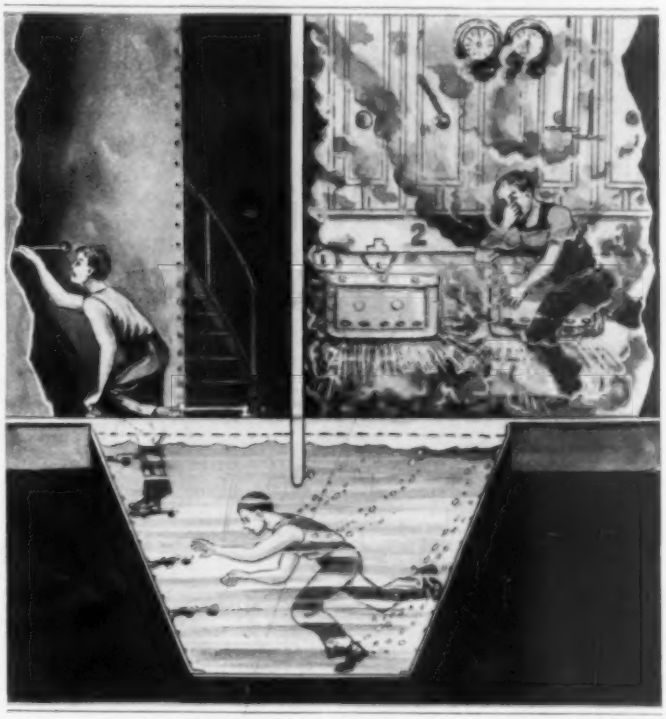
EMERGENCY EXIT DESIGNED FOR SHIPS' FIREROOMS

In an endeavor to provide a practical emergency escape for the safety of those confined in the boiler rooms of steamships, an eastern inventor has designed a water-seal exit. This consists of a large tank constructed in the floor of a fireroom and extending beneath a wall or bulkhead into an adjacent compartment. The container is filled with water into which the dividing partition extends for several inches, forming an effective seal against the passage of steam.

The purpose of this will be evident when it is remembered that existing boiler-room exits are not so built as to permit escape in case a pipe bursts, filling the compartment with gases and hot steam. In many of our dreadnaughts, for instance, an exit from a fireroom is a stairway, or trunk, leading to the gun deck. Access to this is usually gained through a water-tight door. In some cases a covered opening in the ceiling, reached by a ladder, comprises the exit. When a forced draft is used the interior of a boiler room is kept under pressure. Because of this and also because of the arrangement of the exits, safe escape is cut off in case of a serious accident. If a door is opened after a pipe has burst, the steam will rush after the men, scalding and suffocating them.

With the tank installed, however, a person would have only to dive into the water, slip beneath the dividing partition and come up on the opposite side in another compartment. From there he could climb to an upper deck in safety. The water-seal exit would obviously be used only in cases of emergency.

The application of the emergency escape to the boiler rooms of steamships, however, represents only one of the uses which may be made of it. In a large office building the engine room is ordinarily situated some distance below the street level. A stairway and possibly an elevator shaft constitute the usual exits. An accident which would cause the compartment to be filled with hot steam or asphyxiating fumes might easily render these avenues of escape as dangerous as those in the aforementioned instance. Therefore the water-sealed exit might be used in numerous places where there are steam or ammonia pipes, or gas tanks.



In the Event of an Accident Occurring in the Boiler Room, the Water-Sealed Exit Furnishes an Avenue of Escape

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¶ Because of the scarcity of dyestuffs since the beginning of the European war, the government of Uruguay has had to change the color of some of its postage stamps.

CHURCH, POOL HALL, AND SALOON UNDER ONE ROOF

The residents of a Mexican settlement in an American city on the

Mexicans Use One Building for Church, Saloon, and Billiard Parlor

southern border possess a building serving dissimilar purposes. The upper portion reached by the front steps is a church. Under it is a pool and billiard room, while the rear end of the building is occupied by a saloon where all sorts of drinks may be obtained at all hours of the day and night, Sunday excepted. There is said to be hardly a moment when the building is not occupied.

¶In the vicinity of Mt. Hope mission in Alaska, 100 miles north of the arctic circle, it is stated, the wind velocity rarely falls below 20 miles per hour. Use is to be made of this fact in installing a new heating system for the mission, according to reports. Large windmills will be set up to furnish power for several electric generators, and current from these will operate heating coils and also light the place.

CONGRESS MAY VOTE WITH NEW TIME-SAVING MACHINE

At any meeting conducted under parliamentary rules considerable time is always wasted in tedious roll calls and voting. A machine has been invented, however, which aims to do away with this trouble. Con-

Model of Voting Device to be Considered by Congress: Shows the Inventor, Desk Push Button, Speaker's Meter, Indicator Board, and Photographic Paraphernalia

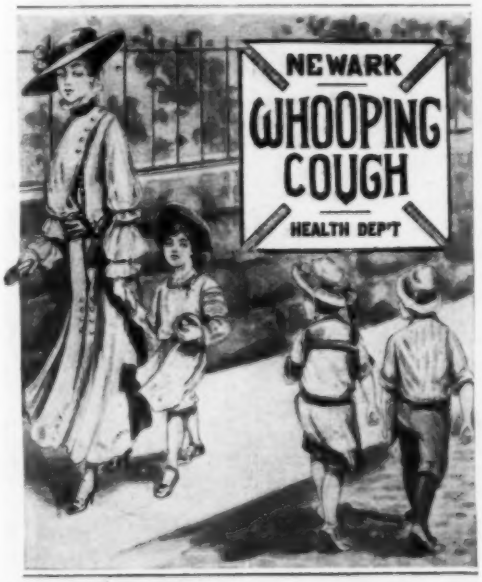
gress has been considering the contrivance and at the next session is slated to take up the matter of having it installed in the legislative rooms of the national capitol.

The invention, as at present projected, consists of three essential parts: a push button sunk in each member's desk, guarded by a combination lock; a dial, also on each desk, to show the member how he is voting, and an indicator board above the speaker to show the assembly by means of letters and colored lights how the vote is progressing. When a question is put, each member may vote "Yes," "No," or "Present and not voting" as in case of pair. Meters on the speaker's and clerk's desks show totals as members vote, but a member may change his vote as often as he wishes while the voting is in progress. When the speaker announces the ballot taken, the clerk disconnects the members, and a permanent record is photographed. The camera records each man's vote and the totals of the ballot, printing the record on paper—all in a few seconds. The board is then auto-

matically cleared for the next vote. Wisconsin already has one of the systems installed in the state capitol. It is the invention of a young Milwaukee engineer.

WHOOPING-COUGH BAND WORN BY CHILD

As a precautionary measure against the spreading of whooping cough at Newark, N. J., a health ordinance makes it mandatory that every child, under 10 years of age, infected with the disease, wear an arm band indicative of the fact. For this purpose the health department of the city has adopted an official band. The background is yellow and a design in the form of a Maltese cross is printed in black on this. Within the cross the words "Whooping Cough" appear in large letters, as does "Newark Health Department." When a child is known to have whooping cough it is supposed to wear one of these labels, and in no

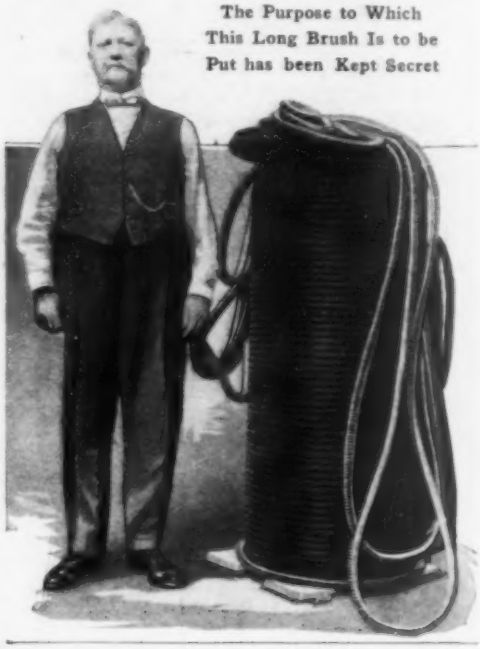


During the Quarantine Period, Every Child Suffering from Whooping Cough must Wear One of the Health Department's Arm Bands

case discard it, for a period of six weeks. The parent who fails to carry out the ruling is subject to court action.

BRUSH OF UNUSUAL LENGTH ATTRACTS ATTENTION

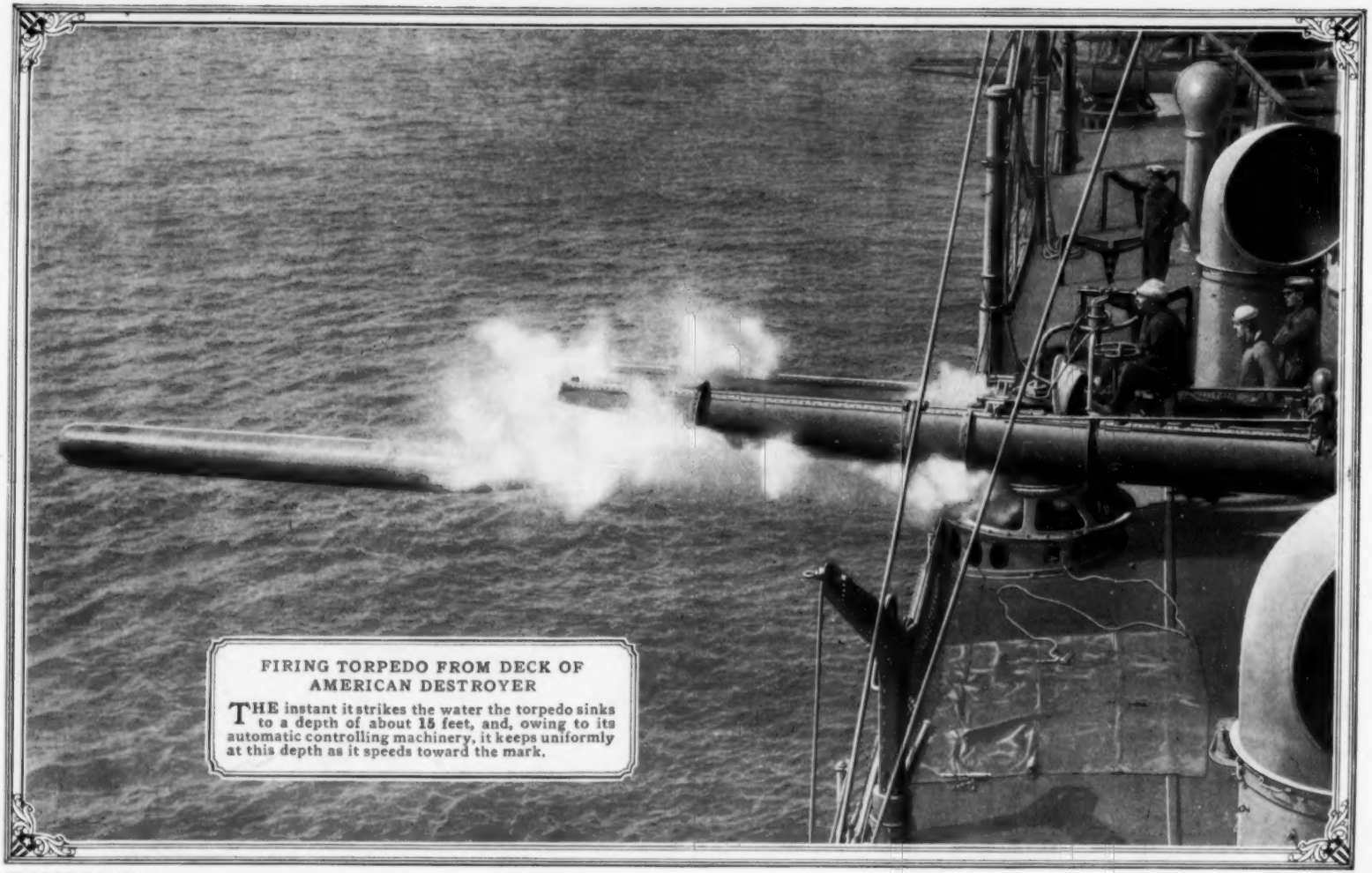
Four hundred and eleven feet is the unusual length of a brush recently produced by a Trenton, N. J., manufac-



The Purpose to Which This Long Brush Is to be Put has been Kept Secret

turer. It is made in a single strip on a leather groundwork of uniform thickness, while the bristles are of the best quality obtainable. The identity of the purchaser as well as the purpose to which the brush is to be put have been withheld by the maker. There is little doubt, however, but that it is intended to be used in a munition factory for polishing and finishing shells. The brush is believed to be the longest of its kind that has ever been made in this country, but irrespective of this, it is of sufficient length to be a subject of comment.

¶Fields in a California valley were inundated last spring by a monster flow of mud from an erupting volcano. Contrary to expectations, the yield of crops in the fall was much greater than ever before, the mud acting as a first-class fertilizer.



FIRING TORPEDO FROM DECK OF AMERICAN DESTROYER

THE instant it strikes the water the torpedo sinks to a depth of about 15 feet, and, owing to its automatic controlling machinery, it keeps uniformly at this depth as it speeds toward the mark.

COPYRIGHT BY E. MULLER, JR

AMERICA'S LATEST UNDER-SEA FIGHTERS

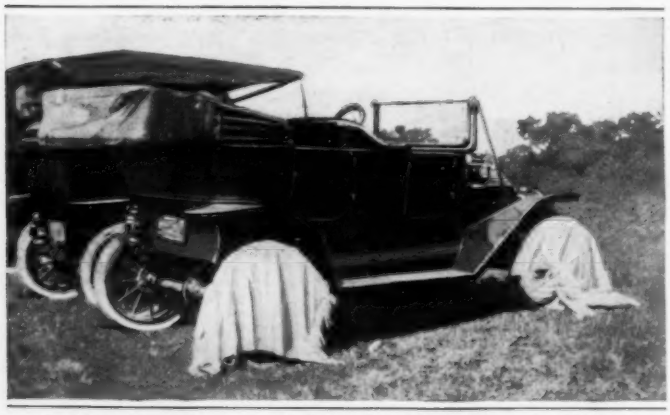
One of the Four United States Submarines of the "K" Class That Made the Cruise, under Their Own Power, from San Francisco to Honolulu

Taking a Torpedo on Board the Submarine "G-2": With the Aid of a Derrick the Torpedo is being Lowered through the Main Hatch into the Storage Compartment Adjacent to the Torpedo Tubes

PHOTOS COPYRIGHT BY E. MULLER, JR.

PROTECTING TIRES IN HOT CLIMATES

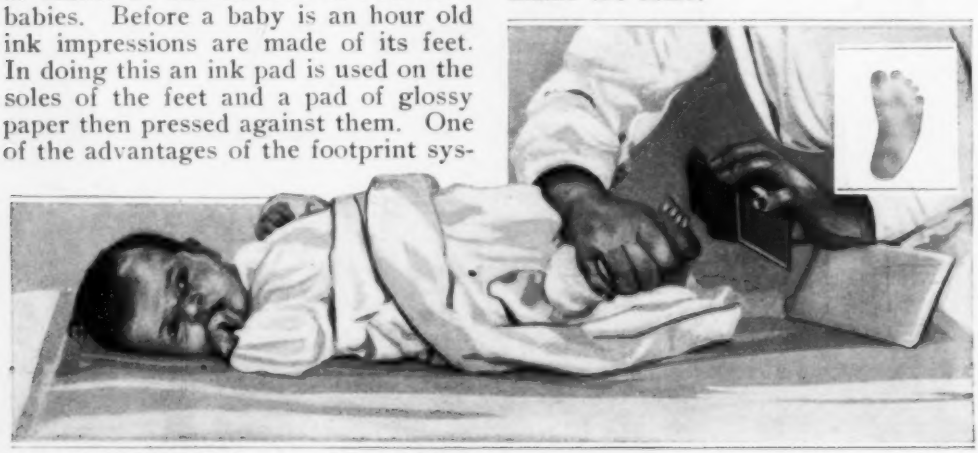
During extremely hot weather when necessity requires the parking of a motor car at a place where there is no available means of protecting it from the blistering rays of the sun, good judgment dictates that some attention should be paid at least to the tires. Rubber of almost any form deteriorates rapidly when subjected continuously to excessively strong light and high temperatures. This is especially true of an inflated tire, for heat, besides injuring the rubber, causes the air within the tubing to expand, sometimes to such a degree that a blowout results. When a machine is left standing in the sunlight for an hour or more it is not unusual for the tires to become too hot to be touched incautiously. The simple precaution of throwing robes, dusters, or almost anything that may be at hand, over the tires in such an instance goes far in protecting them and preventing what might be serious injury.



By Throwing Robes over the Tires, Serious Injury from Hot Sun Rays may be Averted

INFANTS' FOOTPRINTS USED FOR IDENTIFICATION

One of Chicago's largest maternity hospitals has adopted a plan of identification which obviates practically every chance for either the accidental or malicious substitution of new-born babies. Before a baby is an hour old ink impressions are made of its feet. In doing this an ink pad is used on the soles of the feet and a pad of glossy paper then pressed against them. One of the advantages of the footprint system is that it furnishes a permanent record which is kept on file at the office of the hospital. Every child is born with certain lines on the soles of its feet which are distinctive. As the feet develop in size the markings are likewise enlarged, but the general pattern remains the same.

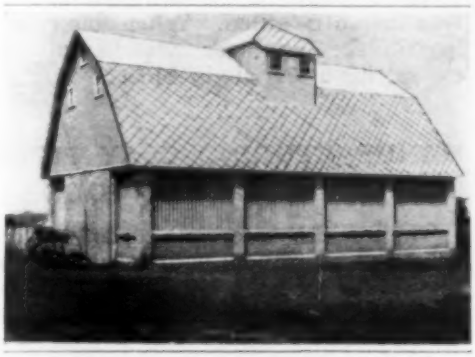


After the Soles of the Feet have been Inked, a Pad of Glossy Paper is Pressed against Them. The Impressions are Then Filed in the Office of the Hospital

FARMER ORIGINATES A NEW STYLE OF GRAIN BUILDING

In an attempt to rid himself in some degree of the necessity for making continuous repairs to buildings about the place, a Mississippi Valley farmer recently tried an experiment. Knowing of the durability of concrete, he undertook to make a corncrib and granary of that material. The result was a cheap and satisfactory building.

Round concrete fence posts were used as sides for the structure, spaced far enough apart to give the usual ventilation required in corncribs. The roof was supported by concrete columns at suitable intervals, and the framework of the roof, though of wood, was covered with concrete shingles. A center driveway runs through the building. The upper floor is used for housing small grain, and an elevator, propelled by a gasoline engine, hoists corn or grain into the bins. The materials for the building cost in the neighborhood of $700.



Concrete Corncrib and Granary Built by Middle-Western Farmer

RECEIVER CUSHION AIDS IN HEARING

With the idea of relieving telephone users of the annoyance attendant to carrying on a conversation in noisy places, an eastern concern has put out what it calls a "receiver cushion." It is made of soft rubber and molded to fit snugly over the end of a receiver and against the ear. It is said to shut off all outside sounds and materially increase the ease with which messages may be heard.

The Cushion Is Soft and Fits the Ear Closely

POWDER-FILLED LEAD TUBE FORMS FUSE LIGHTER

To facilitate the work of setting off powder blasts, a fuse lighter of a novel type has lately been introduced. In general appearance it is much like an ordinary caster such as is used with heavy pieces of furniture. This frame holds a reel on which a small lead tubing filled with powder is wound. One end of this protrudes through a hole in the upper part of the device, permitting different lengths to be drawn out as they are needed. When it is ignited the powder spits out a tongue of flame

Fuse Lighter, for Use in Setting Off Powder Blasts, Which may be Carried in a Pocket Conveniently

several inches in length which quickly lights a fuse when brought into close contact with it. At the point from which the tube issues from the holder a small clipper is fixed. By pressing the thumb against this, the used portion of a tube is cut off.

NEW FERRY LARGEST ON THE GREAT LAKES

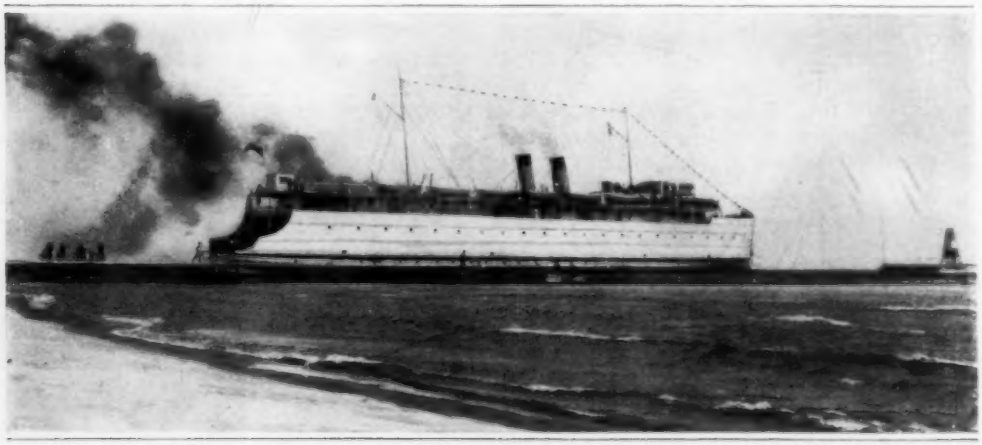
For service on Lake Ontario between Cobourg, Ontario, and Charlotte, N. Y., the port for Rochester, N. Y., there has recently been completed at Toronto the ferry "Ontario No. 2," the largest boat of the kind ever built for the Great Lakes. This boat is a twin-screw steamer of the shelter-deck type and is both a car ferry and a ferry for passenger traffic. It has track capacity for 30 standard railroad cars and accommodations for about 1,000 passengers, in addition to the officers and crew. The over-all length of the ship is 318 ft., the beam 54 ft., and the draft with full load 16 ft. 3 in. It is driven by triple-expansion engines having a total of 4,500 hp. The ship is equipped with water-tight bulkheads, both transverse and longitudinal, and with three water-ballast tanks. The guaranteed speed is 13 miles an hour in open water. The vessel is to run at all seasons of the year, and is built of exceptional strength so it can break through ice.

BURNED-OUT TRANSFORMER CAUSES FATAL ACCIDENT

A striking example of the need for intelligence and caution when an accident happens to electrical machinery is given in the recent burning out of a transformer that supplied current for the operation of a stone quarry. The instant the transformer burned out, a current of 4,000 volts was passed through the hoisting motors. Ignorant of what had happened the engineer in charge of the motors placed his hand on the lever. Owing to the heavy electrical charge in the machine he was held fast, but was not killed for the reason that he wore rubber shoes. In attempting to rescue the engineer, a workman took hold of his hands instead of shutting off the switch, and was instantly killed. When finally released the engineer was uninjured except for a few slight burns.

MANUFACTURING CLAY PIPES IN QUAINT CITY OF GOUDA

One of the interesting handicrafts practiced at Gouda, a little old city a few miles outside of Rotterdam, is the manufacture of "churchwardens," as clay pipes with long stems are called. Skilled labor is so cheaply purchased in Holland that even today



This Car Ferry, the Largest on the Great Lakes, Is Capable of Carrying 30 Railroad Cars and 1,000 Passengers

"Churchwardens" for Which Gouda Is Famous, and One of Their Makers

Painting Quaint Holland Scenes on Some of the Choice Bowls

this work is done by hand, just as it has been done for several centuries. The pipes are cast in plaster molds, filled with a fine, thoroughly kneaded clay that is procured in the vicinity of Gouda. The stems are bored with a long, oiled needle. After this work has been accomplished, the pipes are given a preliminary drying and polishing, and then placed in a kiln where they are baked. Many of the bowls, especially the choicer specimens, are hand-painted in bright-colored, quaint designs. The men who do this work are very adept at bringing out their effects with a few strokes.

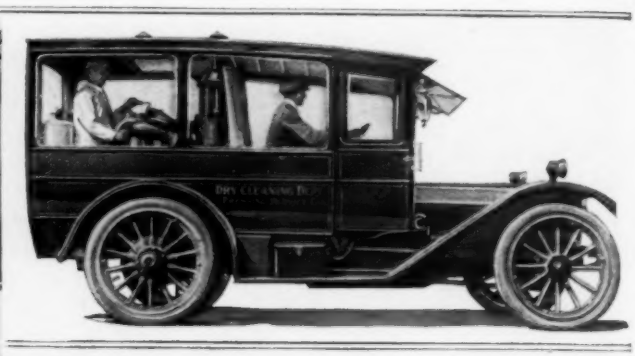
Putting the Finishing Touches to a New Mold: This Is the Most Painstaking Part of the Work

POOR CONCRETE IS CAUSE OF SILO'S COLLAPSE

After being filled for the third time, a reinforced-concrete silo on a farm near Ft. Logan, Colo., recently broke apart. An insufficient amount of cement had been used in the concrete mixture when the structure was being erected, and this subsequently caused cracks to appear in a number of places. Wire fencing had been used as reinforcement and served to hold the sections together temporarily. Acid, probably acetic, developed by the fermentation of the ensilage, reached the wire through the fissures in the concrete and eventually weakened it to the point that one side of the structure suddenly gave away.

¶ The "immaculate white" characteristic of hospitals has been found fatiguing to the eye by British surgeons, and for this reason a number of British hospitals are being fitted up entirely in green, as the color is restful and offers no sharp contrast to the colors of the wound surfaces.

Too Sparing a Use of Cement in Mixing the Concrete Was the Cause of This Silo Breaking Apart While Filled



A Pressing Machine is Installed in the Car and Work is Done at a Patron's Door

NOVEL SERVICE PROVIDED BY LAUNDRY COMPANY

Men's suits are pressed in a motor-car tailor shop which has been placed in service by an Illinois laundry company. Instead of calling at an address for clothing and delivering it the following day after the work has been finished, the new car is sent to a patron's door and the pressing is done at the curb line. The machine has an inclosed body in which is installed a steaming apparatus and a small work table. By this arrangement customers are afforded quicker service than could otherwise be maintained, and garments are not crushed by being carried around in a delivery wagon. Delays are eliminated, and the cost of the collection and delivery of clothes used where it improves the service and advertises the business.

NATIVES OF PHILIPPINES DERIVE SALT FROM SEA

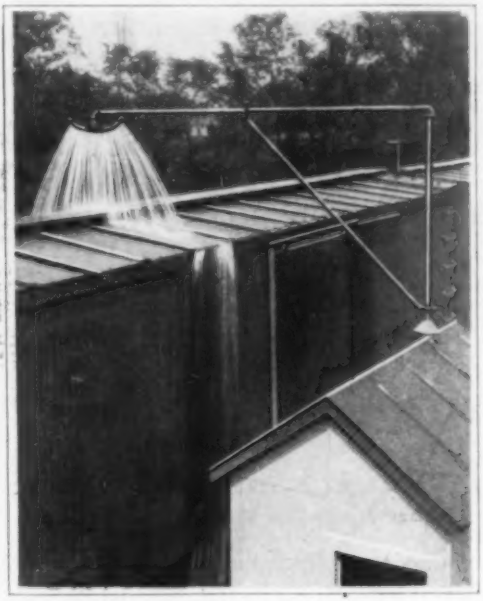
Although few if any Americans look upon salt as being either an expensive necessity or a luxury, the contrary is almost the case with the poor classes of native Filipinos. These peasants, whose diet consists largely of fish,

Evaporating Ocean Water to Recover Salt in the Province of Cavite

consume large quantities of salt. Because they are usually unable to afford the imported product, their supply, to a considerable extent, depends upon home production. This means the evaporation of sea water and the recovery of the resulting saline deposit. In some localities this constitutes quite an industry and open-air salt beds are common.

DEVICE FOR FINDING LEAKS IN FREIGHT-CAR ROOFS

Detecting leaky roofs in freight cars is ordinarily a difficult task unless the car has been run through a rainstorm and part of the goods carried in the car damaged. To overcome this difficulty a western railroad has installed at its repair shops an apparatus with which the roof can be tested and all leaks found. This consists simply of a sprinkling head with which a powerful spray is thrown downward on the roof. When a car is brought in for repairs, it is run under the sprinkling head, the spray is turned on, and a repairman enters the car and plainly chalk-marks each leak. After the car has been repaired it is again run under the spray to see if all the leaks have been stopped. Thousands of gallons of water are used daily with this apparatus, but in spite of this expense a great saving has been brought about,

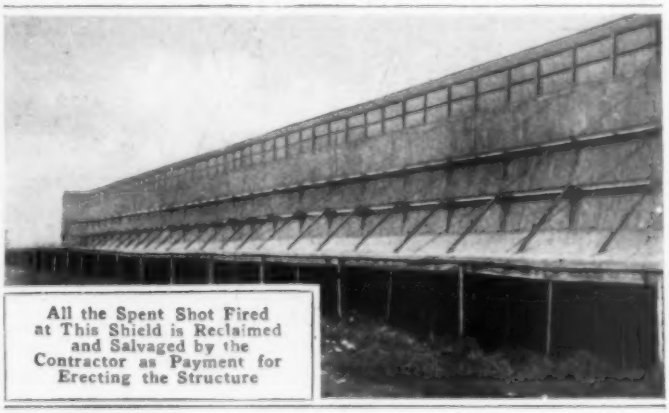


With This Sprinkling Apparatus All the Leaks in the Roof of a Freight Car are Quickly and Easily Found

owing to the fact that claims arising from water-soaked goods have been almost entirely done away with.

SHIELD FOR TRAP SHOOTERS BUILT BY ODD CONTRACT

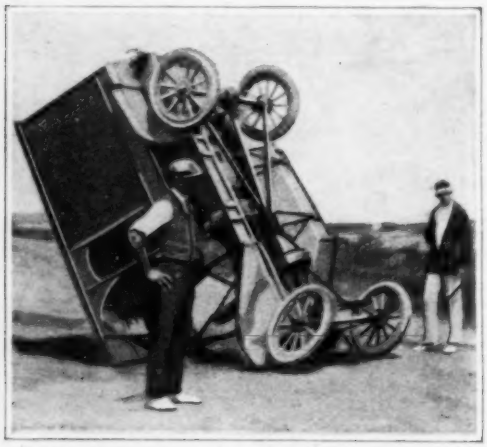
On the condition that he should receive all of the lead shot caught in its apron during a specified period, a Chicago contractor recently supplied the lumber and erected a shield 500 ft. in length and 40 ft. high before the traps at a local gun club. The structure is securely bolted to a row of telegraph poles and contains more than 50,000 sq. ft. of lumber. The apron extending along the full length of the wall is 60 ft. in width. It sags considerably in the middle, so that the spent shot striking the shield rolls back into this gutter and is thus reclaimed.



All the Spent Shot Fired at This Shield is Reclaimed and Salvaged by the Contractor as Payment for Erecting the Structure

QUEER ANTIC IS PERFORMED BY SMALL MOTOR CAR

While running along a New Jersey road at a rate of about 25 miles an hour, a light delivery car recently struck a



An Encounter with a Mudhole Was Responsible for This Curious Accident

mudhole and literally stood on its head. The accident happened when the machine was turned to one side of the roadway in passing another motor. The soft mud held one of the front wheels fast, causing the rear wheels to spin around with such force that the machine started to turn a somersault and ended by tilting on its radiator. The driver and his helper were thrown from their seats, but not injured. The engine continued to run as if nothing had happened until the gasoline ran out of the supply pipe and carburetor. Except for a bent radiator and a broken windshield the car was not damaged, and a few hours later it resumed its duties.

NATURALIZATION OF ALIENS URGED BY GOVERNMENT

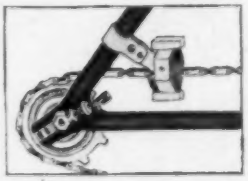
A campaign for the unifying, education, and naturalization of foreign citizens in this country is being conducted by the Bureau of Education of the Department of the Interior. Lithographed posters of generous size were recently issued by the bureau discussing the subject in detail. These are to be distributed throughout the post offices, industrial establishments, and public places in general, of the nation. In the upper central portion of the poster Uncle Sam is seen grasping the hand of an immigrant workman, while in the background loom up a public school, a residence, and a judge handing over naturalization papers to a successful candidate. These are emblematic of the successes and benefits to be attained in America.

"Learn English," advises the poster. "Attend night school, become a citizen. It means a better opportunity and a better home in America. It means a better job; a better chance for your children; a better America. Ask the nearest public school about classes. If there are none in your town, write to the United States Bureau of Education."

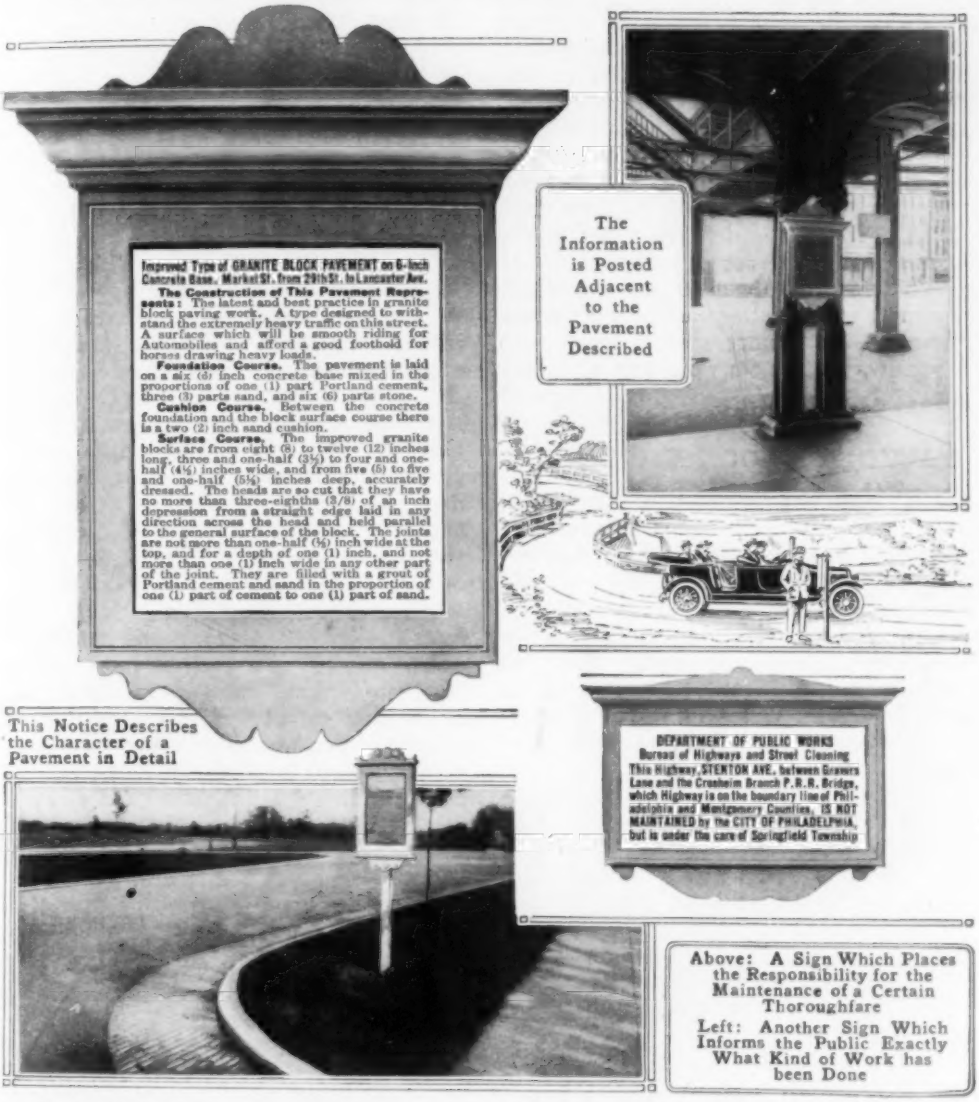
This spirit of welcome and wholesome suggestion is repeated on the poster in six other languages—Italian, Polish, Yiddish, Lithuanian, Bohemian, and Hungarian. To the 3,000,000 foreign-born whites, 10 years and over, in the United States, who cannot speak or write English, this invitation, and what it implies, will no doubt become doubly acceptable because of the use of the native language.

AUTOMATIC CLEANER FOR BICYCLE CHAINS

A simple device that keeps a bicycle chain free from mud and grit and requires no attention from the rider has recently been placed on the market. This device consists of a clip in which are mounted two brushes made of hog's hair, and it is attached to the bicycle frame in such a way that the chain runs between these brushes. Automatic oiling of the chain is provided for by saturating the brushes in oil before starting on a trip. The brushes are easily cleaned by washing in gasoline or kerosene.



CITY TEACHES TAXPAYERS PAVING VALUES


Improved Type of GRANITE BLOCK PAVEMENT on 6-inch Concrete Base, Market St. from 29th St. to Lancaster Ave.
The Construction of This Pavement Represents: The latest and best practice in granite block paving work. A type designed to withstand the extremely heavy traffic on this street. A surface which will be smooth riding for Automobiles and afford a good foothold for horses drawing heavy loads.
Foundation Course. The pavement is laid on a six (6) inch concrete base mixed in the proportions of one (1) part Portland cement, three (3) parts sand, and six (6) parts stone.
Cushion Course. Between the concrete foundation and the block surface course there is a two (2) inch sand cushion.
Surface Course. The improved granite blocks are from eight (8) to twelve (12) inches long, three and one-half (3½) to four and one-half (4½) inches wide, and from five (5) to five and one-half (5½) inches deep, accurately dressed. The heads are so cut that they have no more than three-eighths (3/8) of an inch depression from a straight edge laid in any direction across the head and held parallel to the general surface of the block. The joints are not more than one-half (½) inch wide at the top, and for a depth of one (1) inch, and not more than one (1) inch wide in any other part of the joint. They are filled with a grout of Portland cement and sand in the proportion of one (1) part of cement to one (1) part of sand.
The Information is Posted Adjacent to the Pavement Described
This Notice Describes the Character of a Pavement in Detail
DEPARTMENT OF PUBLIC WORKS
Bureau of Highways and Street Cleaning
This Highway, STENTON AVE., between Greaves Lane and the Crosheim Branch P. R. R. Bridge, which Highway is on the boundary line of Philadelphia and Montgomery Counties, IS NOT MAINTAINED by the CITY OF PHILADELPHIA, but is under the care of Springfield Township

Above: A Sign Which Places the Responsibility for the Maintenance of a Certain Thoroughfare

Left: Another Sign Which Informs the Public Exactly What Kind of Work has been Done

At Philadelphia the municipal bureau of highways has adopted an interesting system of giving the public reliable information concerning various types of paving materials and their relative merits. The plan is in reality a publicity scheme through which taxpayers are instructed in technical phases of road building. This is being promoted by erecting signs describing in detail the character and specifications of different pavements. In putting the idea into effect an experimental roadway was built. This was divided into a number of sections, each of which was paved with a different material, or by a different process. The thoroughfare is subject to normal traffic conditions and adjacent to each section a sign giving a thorough description of the pavement used is posted in a glass bulletin case. This gives interested persons an opportunity to study the wearing qualities

of various kinds of pavement at first hand.

Signs are also being placed along city streets where paving is being laid. It is intended to carry the idea out still further so that when repair work, such as patching and resurfacing, is being done, a placard will give the particulars of just what is under way. Signs will also be used to admonish abutting property owners, prior to the construction of a new pavement or the resurfacing of an old one, to install, or renew, street piping in order to avoid the subsequent necessity of tearing up a roadway to lay a new gas or water pipe.

FACTORY CLOCK EMPLOYED TO PROMOTE SAFETY

In many places the stock phrase "Safety First," which has been universally used during the last few years in an attempt to minimize industrial accidents, is coming to be supplanted by the term "Safety Always," which is even more significant than the predecessor. A large manufacturing company, going on the theory that the psychology of impression is worthy of recognition, has placed in its plant a "Safety Always" clock. The dial of this bears the letters of the two words in lieu of the usual figures. It is assumed the average workman looks at a clock frequently during the course of a day and that this motto will make him constantly cautious.

Workmen Who Watch the Clock in This Factory are Continually Reminded to Exercise Caution in Whatever They Do

LENGTH OF THE COAST LINE OF THE UNITED STATES

Mainly in connection with the problem of national defense, inquiry is often made as to what is the length of the coast line of the United States. According to a statement issued by the Coast and Geodetic Survey the answer to this question is indefinite, since it depends on the extent to which the actual coast line is followed in making the measurement. There is a wide difference between a measurement that takes into account only the general lines of the coast and one in which every minute indentation is followed. Measured along its general trend the coast line of the United States and Alaska exceeds 11,500 miles, while the detailed coast line measured as closely as possible on large-scale maps is approximately 91,000 miles. On the same basis the general coast lines of the insular possessions and the Canal Zone have a total length of about 5,400 miles and the detailed coast lines a total length somewhat in excess of 12,000 miles.

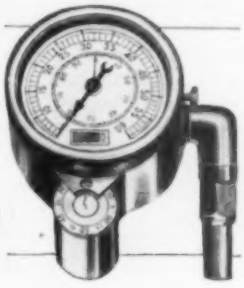
ROPE-TESTING MACHINE'S WORK SAVES LIFE

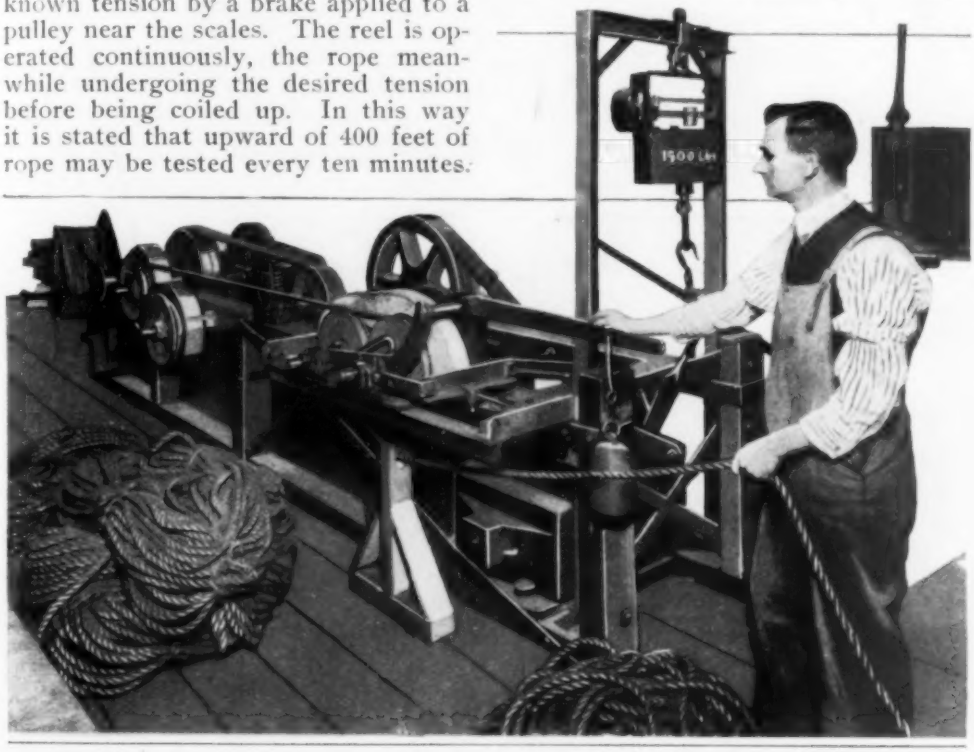
Ropes, even though they may appear to be in prime condition externally, are often faulty and filled with invisible defects. Spilling acid on some portion of their length has been known to be a most prolific source of rope troubles, for the injury caused by acid does not appear at once but after some months when the slow rot has had time to take effect. Exposure to weather or undue moisture may also create faulty places.

Since workmen on tall buildings, or similar structures, so often get themselves into positions where their existence depends entirely upon one or two ropes, it becomes imperative to know that these ropes are sound. In the case of short lengths it is comparatively easy to test ropes satisfactorily, but when the ropes are long and heavy, the problem becomes troublesome. A machine has been invented which will do this work automatically. On one end of a frame are a set of pulleys and a reel operated by an electric motor. On the other end of the frame is another set of pulleys, but these are mounted independently and their frame is capable of sliding back and forth in guides against the pull of a cable attached to a weighing machine. In use, the rope to be tested is first looped around the pulleys on the weighing end, then passed to the pulleys attached to the reel. The intermediate length of rope is kept under known tension by a brake applied to a pulley near the scales. The reel is operated continuously, the rope meanwhile undergoing the desired tension before being coiled up. In this way it is stated that upward of 400 feet of rope may be tested every ten minutes.

SPEEDOMETER SETS LIMIT AT WHICH AUTO MAY RUN

The ordinary functions of a speedometer—indicating rate of travel and mileage already covered—have been augmented by a third in a machine recently evolved by an eastern manufacturer. The new instrument is arranged to govern the speed of the car as the additional feature, and this is accomplished in a simple way. In the base of the speedometer frame is a small barrel containing tumblers and other mechanism of a Yale lock. Inserting the proper key in this lock permits a dial at the top to be revolved and set at any desired figure. This





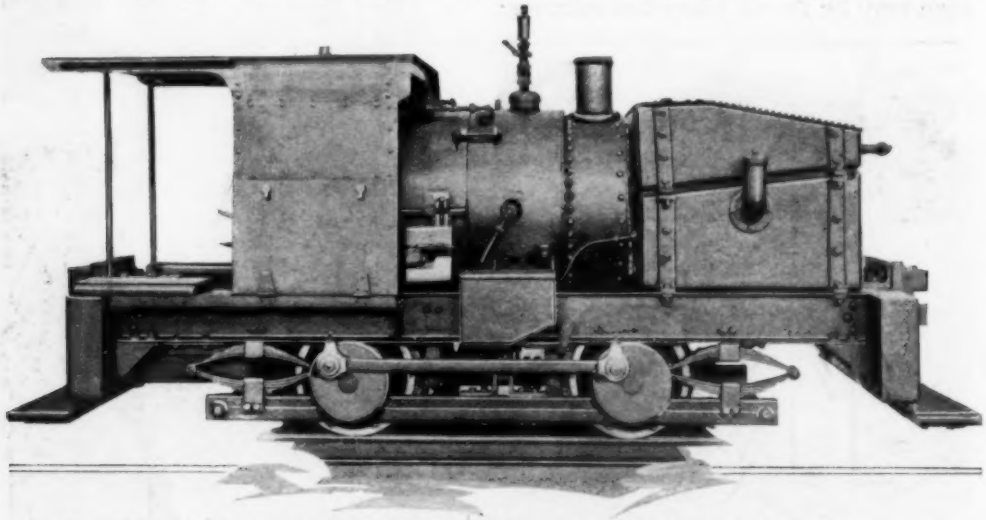
The Straight Length of Rope between the Pulleys in the Foreground and Those in the Back Is under a Tension Applied with a Brake and Measured with the Scales

figure will thereafter represent the speed above which the automobile cannot go, and withdrawing the key effectually prevents the numbers being changed.

In use, the contrivance works on the carburetor rod. When the indicator on the speedometer nears the speed set, a certain contact is formed within the instrument, causing an electromagnet slowly to close down the carburetor. A corresponding slackening of the automobile's speed results. This type of speedometer was evolved, according to the manufacturer, to fill the particular needs of the car owner who wants to be sure that the chauffeur, or other operator of his machine, does not run it at an excessive rate in his absence. Then, too, in other cases the setting of the locked dial might serve as evidence against a traffic officer's claims of undue speeding.

NEW TYPE OF OIL-BURNING LOCOMOTIVE

An oil-burning locomotive of a new type, designed particularly for construction work, is equipped with a boiler in which, it is claimed, a full head of steam can be raised in 15 minutes. The principal feature about the boiler is the use of a large number of ½-in. copper flues, each about 16 in. long. These locomotives are made in sizes ranging from 2 tons to 12 tons. On the 5-ton size, which has a 2-ft. gauge, the complete boiler, with fire box and smoke box, measures only 34 in. in diameter and 37 in. in length. The engine is equipped with ball bearings, and the power is transmitted to the drivewheels through gearing. Any kind of fuel oil may be used.



In This Oil-Burning Locomotive, Which is Designed Particularly for Construction Work, a Full Head of Steam can be Raised in 15 Minutes

JETS FROM FIRE ENGINE BREAK ROCK FORMATION

The tremendous digging power a small jet of water going at high velocity possesses, as well as the curious uses to which a fire engine may sometimes be put, were recently demonstrated in an interesting manner by a contractor on the Atlantic coast. While excavating in an ocean bed at the bottom of a small cofferdam he struck a rock formation which could not be broken by ordinary means. The smallness of the cofferdam precluded the use of blasting powder, the most obvious remedy, inasmuch as an explosion to break up the rock would also blow up the cofferdam. As a solution, a fire engine was secured from a near-

by city, and a 1-in. jet at 150-lb. pressure forced against the resistant rocks. Oddly enough, this small but insistent stream of water was sufficient to loosen the pieces so that a clamshell bucket could get hold of them without difficulty. By this simple means what promised to be a constructional difficulty of some magnitude was quickly and easily solved.

HEAVY CONCRETE SLABS ARE ROUTED BY FLOOD

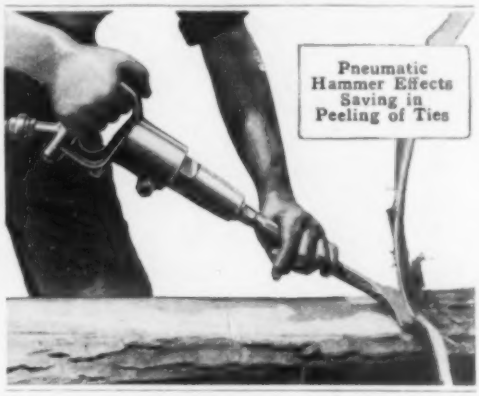
A river current of 40 miles per hour recently tore up a long section of concrete road near a southern city. The road had been made in sections, 15 ft. by 30 ft. in size, and conformed more or less to the usual requirements of concrete-pavement construction. Each slab is stated to have weighed over 20 tons, and in some cases these were carried 30 ft. beyond the proper line of

A Recent Ohio River Flood Carried These 20-Ton Slabs 30 Feet Out of Line

the road. Even with such rough treatment the slabs seemed to be in rather fair condition, few being seriously cracked or injured.

COMPRESSED AIR DRIVES AX OUT OF TIE-PEELING FIELD

A compressed-air concern is putting out a chisel-and-pneumatic-hammer contrivance which is said to peel from 150 to 200 ties per day, and to reduce the cost per tie from two to three cents. A vertical, single-acting air compressor, driven off a line shaft in



Pneumatic Hammer Effects Saving in Peeling of Ties

the usual shop, supplies the air for operating the new tool.

Time was when an expert peeler commanded a price of five cents per tie. This at first may not seem like a prohibitive amount, but it may easily run into thousands of dollars, as may be seen when it is considered that the average double-track system requires upward of 6,000 ties per mile. At five cents per tie the old-fashioned ax wielders would get $300 for each mile.

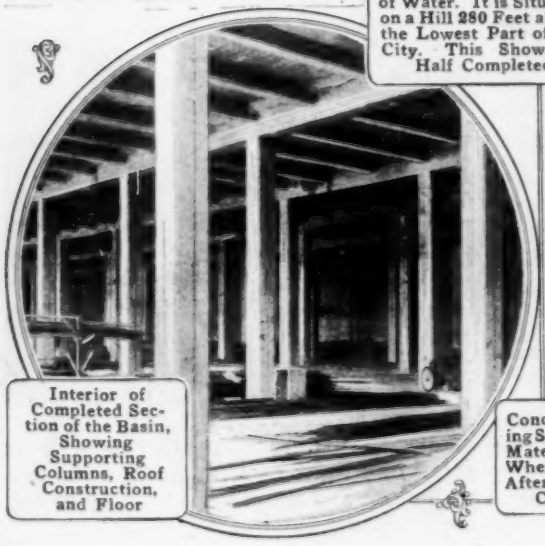
ESCAPING AUTOMOBILE TUBE FORMS MINIATURE BALLOON

A curious accident happened to an automobilist recently. While bowling along at a 30-mile-an-hour clip, a rear tire came partly off, permitting a portion of the inner tube to escape. When the driver had succeeded in stopping the car, and got down to inspect damages, he beheld the inner tube swelled into a huge balloon of football shape. The outer tire had pinched the inner one tight enough against the rim to inclose a considerable volume of air, thus causing the bulge.

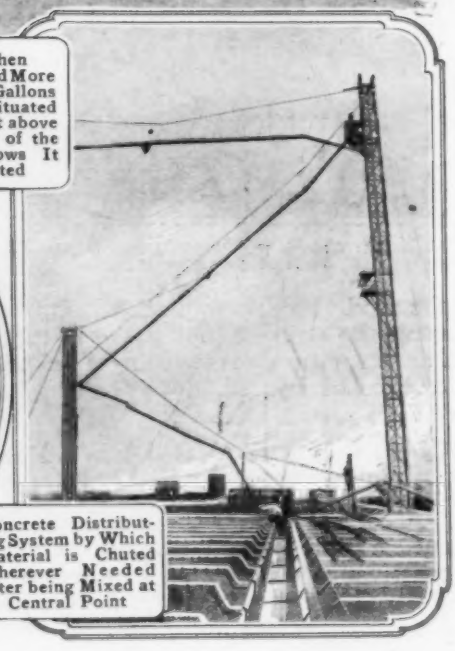
LARGE REINFORCED-CONCRETE RESERVOIR

Steel Reinforcement Laid over Frame Forms Ready for the Concrete to be Poured: This Is a Section of the Roof, Which Eventually will be Covered with Earth

The Basin When Finished will Hold More than 20,000,000 Gallons of Water. It is Situated on a Hill 280 Feet above the Lowest Part of the City. This Shows It Half Completed

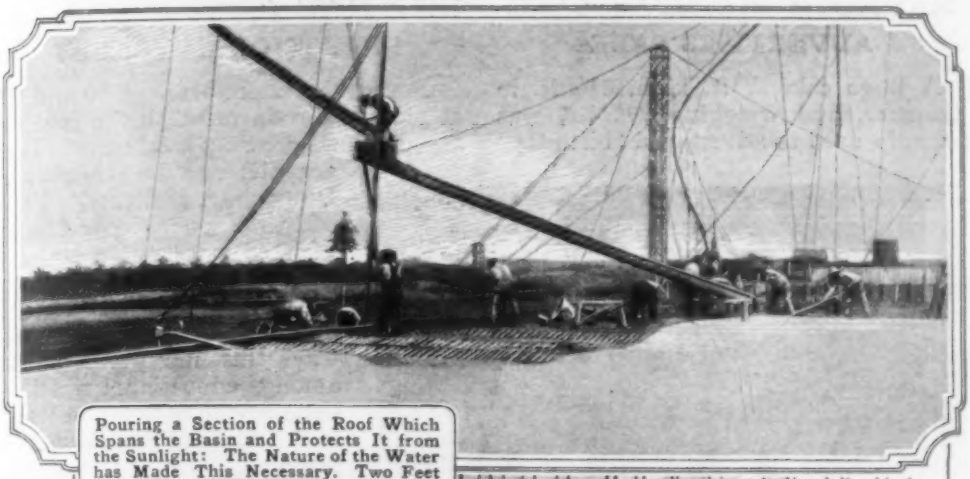


Interior of Completed Section of the Basin, Showing Supporting Columns, Roof Construction, and Floor

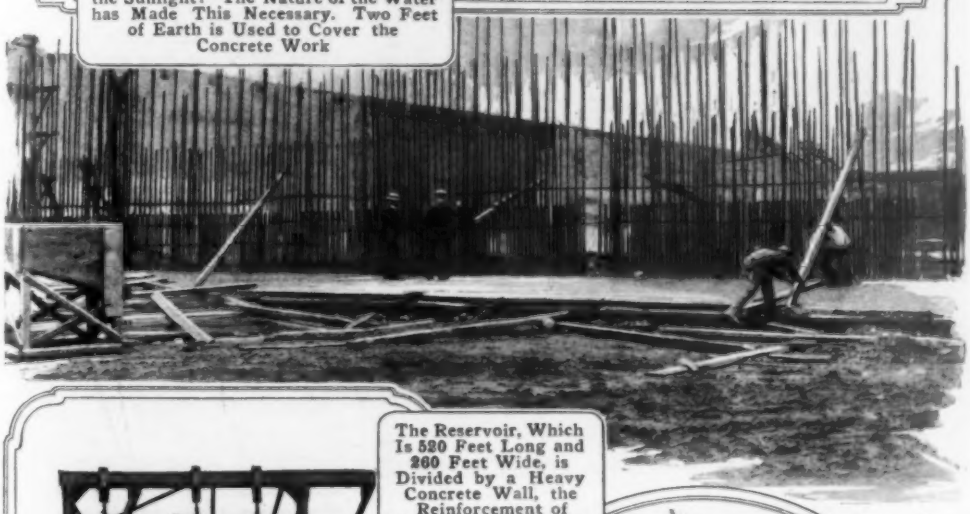


Concrete Distributing System by Which Material is Chuted Wherever Needed After being Mixed at Central Point

IN COURSE OF BUILDING AT SCHENECTADY

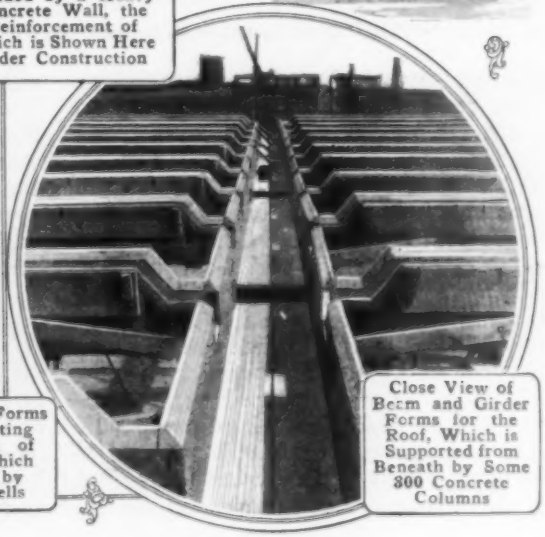


Pouring a Section of the Roof Which Spans the Basin and Protects It from the Sunlight: The Nature of the Water has Made This Necessary. Two Feet of Earth is Used to Cover the Concrete Work



The Reservoir, Which Is 520 Feet Long and 260 Feet Wide, is Divided by a Heavy Concrete Wall, the Reinforcement of Which is Shown Here under Construction

Type of Steel Forms Used in Erecting Outer Walls of Reservoir, Which will be Fed by Artesian Wells



Close View of Beam and Girder Forms for the Roof, Which is Supported from Beneath by Some 300 Concrete Columns

MAMMOTH BIRTHDAY CAKE ADVERTISES SALE

A huge cake, 7 ft. high, 5½ ft. in diameter, and weighing 900 lb., was recently used to advertise a "birthday" anniversary sale in a department store. The recipe called for one barrel of flour, 1,250 eggs, 150 lb. of butter, 200 lb. of sugar, 1½ qt. of flavoring extract, and 2 lb. of baking powder. The cake was a most artistic example of the sugar-sculptor's art. Colored roses, shields, poppies, and cornucopias adorned the creation on all sides. Five columns supported the top layer, and crowning all was a replica of the Santa Barbara mission set around with miniature palms and orange trees. Practically everything on the cake was edible, and more than 30,000 patrons of the store received generous slices. Five of them won prizes of merchandise.

Huge "Birthday" Cake Advertises Department Store Sale

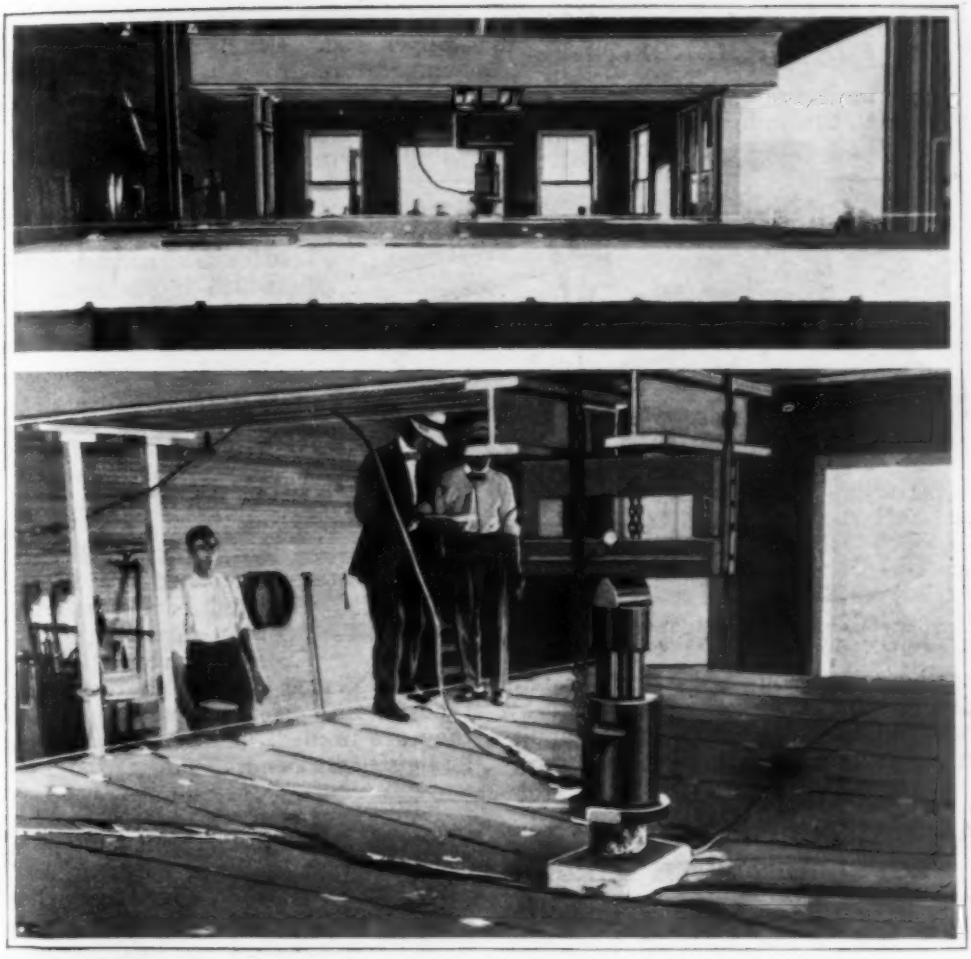
INSTITUTE GIVES USEFUL INSTRUCTION IN TRADES

Classes that meet between 10 and 12 at night are soon to be on the regular schedule of a recently established Minneapolis trade school, the Dunwoody Institute. This odd time for class work was adopted because it best suited the convenience of a group of bakers who desired instruction. In many other ways this new development among educational institutions attempts to adapt itself to the needs of those it would teach.

Established only a short time ago by the will of the late William H. Dunwoody, the institution already gives instruction in bricklaying, carpentering, printing, plumbing, painting, plastering, automobile driving, boiler firing, steam engineering, machine work, electrical construction, and similar trades. Possessed of a $3,250,000 endowment from the Dunwoody estate, tuition is free to students from any part of Minnesota. Supplementing the regular instruction work, attempt is made to give students that practical experience which only apprentice work has heretofore been able to supply. In so doing, it is hoped adequately to fulfill long-felt wants in certain of the trades. One of the most interesting courses is in smoke prevention for firemen, a knowledge of which is much needed because of current agitation against smoke in cities.

CONCRETE BRIDGE STANDS UP UNDER IMMENSE LOAD

The tremendous loads even a simple concrete bridge will withstand were demonstrated in a remarkable manner by recent government tests. That a concrete slab spanning a 16-ft. gap



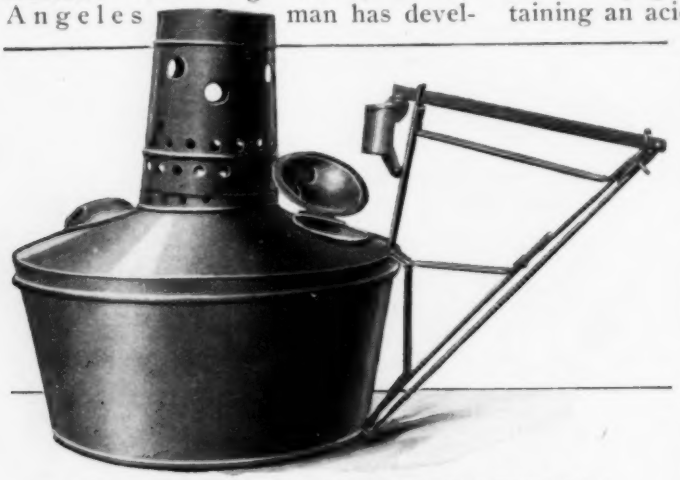
View of the Bridge before the Test, and Later While being Put under Pressure by the Hydraulic Jack

would safely support the weight of two heavy traction engines or motor trucks, even if applied at a point and in the center of the bridge, was amply demonstrated, in the opinion of the experts conducting the tests.

The "bridge" used for the tests was a slab 32 ft. wide, 10 in. thick, and of 16-ft. span. The load was applied by means of a hydraulic jack which worked against four heavy I-beams rigged above the bridge and bolted to the abutments with steel rods. The pressure produced by the jack bore down on a steel slab 1 ft. wide and 2 ft. long, placed in the center of the bridge. Under test the concrete did not crack until a load of 90,000 lb. had been applied. An 84,000-lb. load produced a depression of but 5 in., and even after the center had sagged 8 in. the bridge still safely supported 25,000 lb. Curiously enough, less than a wheelbarrowful of concrete chipped off the bridge during the entire test. The concrete used in the bridge was a mixture of one part cement, two parts sand, and four parts gravel. It was reinforced with ¾-in. iron rods spaced 8⅞ in. apart, and 1½ in. from the bottom of the slab. The bridge was erected indoors, both to allow greater ease in testing and to protect apparatus from the weather.

SELF-LIGHTING SMUDGE POT FOR ORCHARDISTS

By the invention of a simple thermostatic controlling device, a Los Angeles man has developed an ingenious apparatus for rendering the smudge pots used by orchardists self-operating. The appliance, which may be fitted to any standard type of pot, is regulated by a small copper rod. When the atmospheric temperature drops to a predetermined point, the contraction of the rod is sufficiently great to release a cup containing an acid. The liquid is poured into a small chamber provided in the smudge pot. This holds a chemical substance which burns upon the addition of the acid, producing a flame that ignites the crude oil used in the pot. The thermostat may be adjusted so as to release the acid when the temperature falls to any specific degree. With this apparatus in use, an orchard may be protected from frost without personal attention being given it. The pots are placed beneath the trees and brought into use automatically when they are needed, instead of having to be lighted by hand.



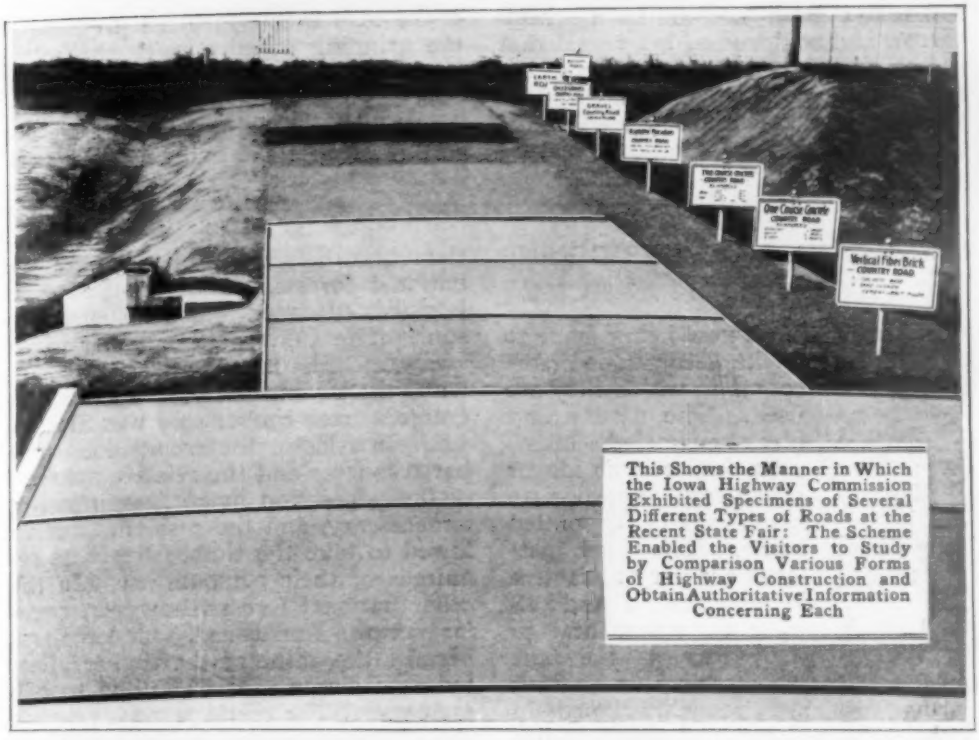
The Operating Device for This Smudge Pot is Controlled by a Copper Rod Which Serves as a Thermostat

AEROPLANE BUILDERS TEST PROPELLERS WITH BARGE

A large manufacturer of aeroplane propellers on the Atlantic coast has devised an effective way to test his products. A flat-bottomed boat, 30 ft. in length and 10 ft. wide, has been rigged up as a sort of hydroplane, using, however, an aerial propeller instead of one under water. A 40-hp. gasoline engine furnishes the power.

Locally the boat goes by the name of the "Water Skimmer," though its general outlines at first remind one of a slow-going barge. However, it is stated that the boat has sometimes attained a speed of 50 miles an hour during these propeller tests, even though it does resemble a barge when at rest. The rate of speed a given propeller will drive the boat is used as a general criterion as to that type's worth and availability for aeroplanes. Propellers made at this plant are said to be doing service for several of the warring European nations, as well as in our own country. Shaping the blades requires considerable skill.

"Water Skimmer" is Used as Tester for Aeroplane Propellers



This Shows the Manner in Which the Iowa Highway Commission Exhibited Specimens of Several Different Types of Roads at the Recent State Fair: The Scheme Enabled the Visitors to Study by Comparison Various Forms of Highway Construction and Obtain Authoritative Information Concerning Each

INSTRUCTIVE ROAD EXHIBIT OF IOWA COMMISSION

In furthering its campaign for better roads through the rural districts, the Iowa Highway Commission recently maintained an interesting exhibit at the state fair held at Des Moines. Various phases of road building were demonstrated and approved materials exhibited, so that thousands of persons were given authoritative information at first hand. Sections of road showing fiber brick, one and two-course concrete, asphaltic macadam, oiled gravel, and similar forms of construction, were built. These, being side by side, gave the visitors an opportunity to make a comparative study of different kinds of roads and learn the advantages of each. Concrete culverts, curbing, and other things pertinent to good roads, were also exhibited, while photographs illustrating different steps in construction, the conditions of existing roads of specific types, and bridges erected in various places were shown.

RAIL GRINDER THAT MAY BE MOVED WITH EASE

In street-railway work it is generally difficult to make repairs on track or overhead construction on account of the necessity for getting out of the way for every passing car. In the grinding of rail joints this is especially true. An English firm has recently marketed

By Lifting Up on the Handles and Twisting Sidewise, This Rail Grinder may be Quickly Removed from the Track

a machine built not unlike a wheelbarrow and so designed in general that it may promptly be removed from the rails at the passage of a car, and as promptly put to work again when the track is cleared. An additional feature is the ease with which the pressure of the grinding wheel may be controlled —simply by pushing down on the handles against the tension of a spring. A small motor taking current from the trolley propels the grinding wheel.

ORNAMENTAL ELECTRIC FANS FOR EVERY ROOM IN HOME

Electric fans are now being made to harmonize with the decorations of the rooms in which they are used. The ordinary black-enameled, brass-vane device is no longer considered appropriate in a well-appointed home. The new patterns are very attractive in appearance and almost as ornamental in their way as the fans are serviceable. They are being designed in certain standard styles to match different kinds of furniture and also in special patterns suitable for certain rooms of a home. Thus a fan which is intended to be used in a bedchamber or dressing room is not necessarily of a type which would be in taste for a living room or library. They are provided with artistic pedestals which are of much the same character as those belonging with reading and piano lamps. Connections may be made with wall or floor sockets.

FREE TIMBER CUTTINGS IN THE NATIONAL FORESTS

Of the 688,922,000 board feet of timber cut from the national forests during the year ended June 30, 1915, a trifle over 123,000,000 feet was taken under free-use permits issued to settlers or others living in or near the national forests. The free-use privilege was extended to about 40,000 persons. The value of the timber given away in this manner was $206,464, while the revenue derived by the government from timber sold was $1,179,448. In Alaska, the tremendous timber resources and the relative sparsity of the population make any formality unnecessary, and the residents are allowed to take the timber freely as required for their personal use. In the other national forests, however, regular permits are issued. Under these permits the value of the timber allotted to a single user is limited to $20 each year. The cuttings must be such as will improve the forest conditions and are usually confined to dead and insect-infested timber, thinnings, and timber of inferior species.

FRENCH ESTABLISH OFFICE TO COLLECT WAR DATA

With a careful eye as to their standing before the world, the French are said to have established an office for the collection and dissemination of accurate data as to the course of events on the French side of the war. The men put in charge of the office are divided into four distinct groups; one for the collection and filing of photographic material, another having care of the archives, still another for foreign affairs, and a last devoted to public instruction and fine arts. All pictures, photographs, orders, records of military operations, reviews of enemy depredations, and such, are to be carefully gathered in and preserved. From time to time articles will be prepared giving the French side of matters in controversy.

TRAIN-DISPATCHING SYSTEM FOR AUTOMOBILES

On a steep, winding grade near Hood River, Oregon, where the road is too narrow to permit two automobiles to pass, a telephone line has been installed for enabling up-bound motorists to ascertain whether or not the road is clear. To find out if it is safe to proceed, the motorist, on arriving at the foot of the grade, simply steps to a telephone placed at the side of the road and calls up the watchman stationed at the summit. Before this system was installed, there were frequent tie-ups caused by the meeting of automobiles on the hill, which made it necessary in each case for the up-bound car to back to the foot of the dangerous grade.

TOWER IS CONVENIENT REST ROOM

In the center of the principal street of Bakersfield, Cal., is a stone tower 80 ft. high and 20 ft. square. The tower has varied uses. In the top is the city clock; in the middle is a large alarm bell, and around the base is a corridor with entrances on all four sides. Stone benches are provided for tired pedestrians. An additional feature of the interior is a rest room. The tower is just one block from the city hall, the library, and the county courthouse. Because of this, the structure is a convenient meeting place for acquaintances from all parts of the city and county.

ANCIENT ELM FORMS PORCH FOUNDATION

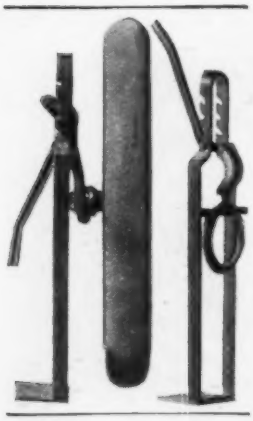
During the construction of a dwelling in Castine, Me., it was found that an ancient elm stood in the way of one corner of the porch, and to avoid the necessity for cutting down the tree, it was decided to use it as a foundation. This was made possible through the fact that the tree stood in exactly the right position, and leaned away from the building sufficiently to allow room for the porch roof. The floor of the porch was simply framed into the tree, while a shelf cut in the side of the tree was made to serve as a base for the corner column.

With a Shelf Cut in One Side, This Ancient Elm was Made to Serve as the Corner Foundation of the Porch

¶ The Russian army boot is being used this winter by the British in lieu of the older puttees, according to a report. This latter type of leg covering came into use during campaigns in India, where its chief utility was as a protection against snake bites. But Russian army boots during the winter of 1914-15 were found much more practical for service in colder climates.

AUTOMOBILE JACK LIFTS ON WHEEL AT HUB

An easily operated automobile jack recently invented has a loop which may be slipped over the projecting hub of the wheel to be raised. A single stroke downward on a convenient lever will then lift the wheel clear of the ground and hold it there until further movement is desired. The contrivance is adjustable as to height so that different-sized automobile wheels may be accommodated.



PLOW BUILT FOR MARSHES USED IN SOUTH

For use in the reclamation work which is being done in some of the southern swamp lands, a power-driven plow has been invented which is capable of working in marshes. The machine consists of a motor tractor mounted on a caterpillar tread, behind which is a toboggan-shaped trailer which drags the ground and carries four disks which do the plowing. These disks are mounted so that they may be raised or lowered by a lever in essentially the same manner as if they were carried on a wheeled chassis. By this arrangement it is possible to run the machine over ground so deep in mire that the use of horses and ordinary farm machinery is out of the question.

The Plowing Disks are Mounted on a Sledlike Trailer so That They are Prevented from Sinking Too Deeply into the Mire

NEW PLAN FOR LOCATING FOREST FIRES

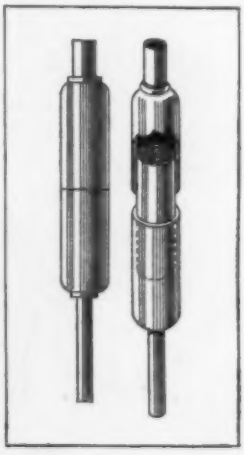
Telegraph and telephone poles along the railway lines are to play an important part in the work of fighting forest fires in Michigan, as the result of a plan just worked out by the chief warden of the state. The poles along the right of way of each railway are to be numbered consecutively, while the engineers traveling through districts where there is danger of fire are to be supplied with cards. On the discovery of a fire the engineer will mark the number of the pole nearest the blaze and will then throw the card from his cab window to the first section crew that he passes. Under the present rules an engineer is required to report a fire at his first stop, and much valuable time is sometimes lost in locating a section crew and dispatching it to the scene of the fire. Under the new plan this delay will be eliminated.

DELAY ELECTRIC CAPS AID IN COUNTING EXPLOSIONS

By firing separate blasts with the aid of delay blasting caps, a means has been found for accurately counting all the holes which explode when a rock is shattered with dynamite, or other explosive. Ordinarily it is difficult to tell whether one or a dozen holes in a given area "went off" at the time of a blast. Believing all holes exploded, many a workman has ventured back to work too early, only to be killed or seriously injured by a belated blast. In firing a series in the new way, the second hole is fired with a delay blasting cap, the third with still another, and so on, until all have acted. This leaves sufficient time interval between explosions so that they may easily be counted, and checked off before workmen return to the danger area.

DRINKING TUBE EQUIPPED WITH FILTER

A new sanitary drinking tube is made of aluminum and contains a bone-charcoal filter through which all the water must pass as it is drawn up through the tube. It is designed particularly for the benefit of motorists, and of travelers generally, who are compelled to drink water obtained from open wells, streams, or other doubtful sources.



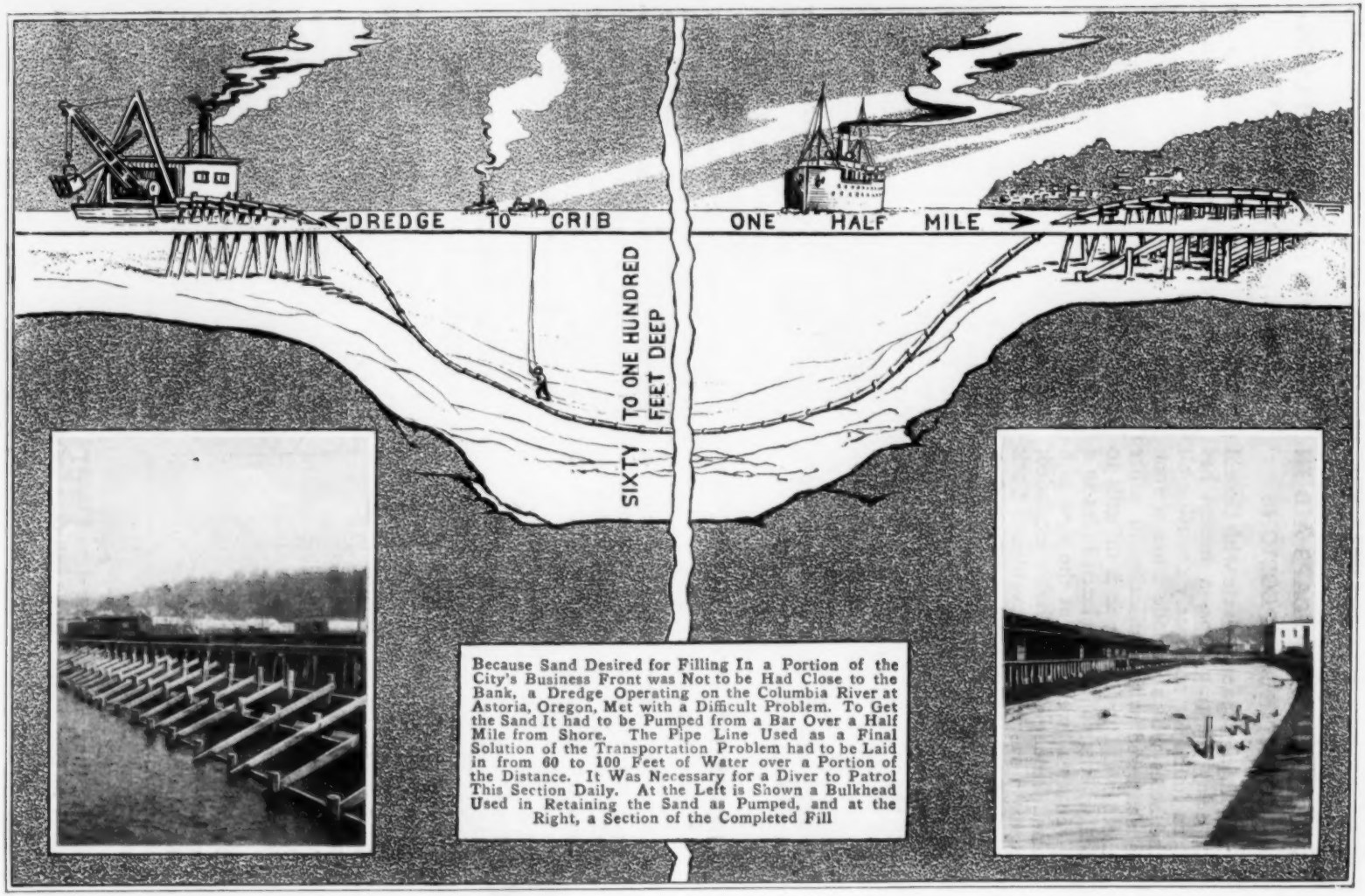
¶A Chicago women's club has placed itself on record as opposing the use of cotton sacks as flour containers. Rather, they advocate the use of heavy paper as being much more sanitary for the purpose.

WALKING STICKS ARE USED INSTEAD OF CRUTCHES

When it is at all advisable to do so, specially designed walking sticks, instead of crutches, are being provided convalescent soldiers in the military hospitals of France. These are made with inclined rests for the forearms so that additional support is given the user. The hand grip is upturned slightly for the same reason. The object in using these canes is that with them a wounded man is able to regain the strength of his lower limbs much more quickly than otherwise. The walking stick forces him to make use of his feet, ankle, and knee joints. The average man recovering from injuries such as a broken leg or crippled foot, exhibits a strong tendency to avoid bearing his weight on his feet. The cane forces him to overcome this.

THREE MILLION FEET OF LUMBER ON LONG TRIP

One of the hugest orders of lumber ever filled crossed the continent a short time ago from the mills in Washington on the Pacific coast to Baltimore, Md., on Chesapeake Bay. The shipment was made up of 3,000,000 ft. of cypress, and 100 cars were required to carry it. These were divided into two trains of 34 cars each, and a third of 32 cars. The railroads used every means possible to rush the shipment, taking short cuts and giving the trains right of way over all other freights in terminal yards. But 17 days in all were required for the trip, and only four for the part between Chicago and Baltimore.



Because Sand Desired for Filling In a Portion of the City's Business Front was Not to be Had Close to the Bank, a Dredge Operating on the Columbia River at Astoria, Oregon, Met with a Difficult Problem. To Get the Sand It had to be Pumped from a Bar Over a Half Mile from Shore. The Pipe Line Used as a Final Solution of the Transportation Problem had to be Laid in from 60 to 100 Feet of Water over a Portion of the Distance. It Was Necessary for a Diver to Patrol This Section Daily. At the Left is Shown a Bulkhead Used in Retaining the Sand as Pumped, and at the Right, a Section of the Completed Fill

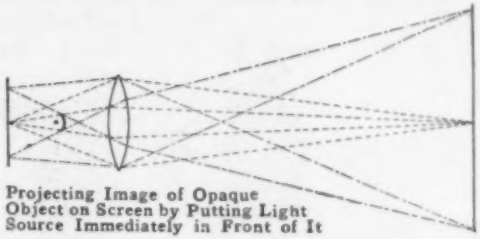
DREDGE RECLAIMS TIDE FLATS OF WESTERN CITY

An ingenious scheme for filling in and building up an area of valuable but formerly much flooded land is being carried out at Astoria, Oregon. The business district stands on piles at the river edge, the district beneath being in a more or less continual state of inundation, due to the general lowness of the ground.

A bulkhead was built along the channel edge of the river for a distance of about one mile and a half, and behind this, sand from the river bottom is being dredged in. Owing to the soft mud composition at the bottom near the shore and the great depth of channel, it was necessary to go over a half mile out in the river to a sand bar in order to obtain suitable material for refilling. The dredge was anchored at the sand bar and the discharge pipe run on a trestle to the edge of the channel. Here, for a distance of about 1,200 feet, the discharge pipe had to be laid on the river bottom, in from 60 to 100 feet of water. After being brought to the surface at the bank, a trestle work carried the pipe the remaining distance to the fill. The underwater portion is patrolled daily by a diver. The material being clean white sand and put in with water, it settles at once, causing little delay before becoming hard and compact.

NEW WAY TO PROJECT IMAGE OF OPAQUE OBJECT

Two Pennsylvania inventors have recently devised a new method for projecting the images of opaque objects on a screen. The plan is quite different from that which has heretofore generally been followed and requires less illuminating power. Instead of the light source being outside of the path between the object to be reflected and the lens, it is put immediately between the object and the lens. A condensing lens is placed at the front of the projecting apparatus; back of it and on its major axis is a reflector; back of this a source of light, and at the extreme back the object. The light is in this way thrown directly away from

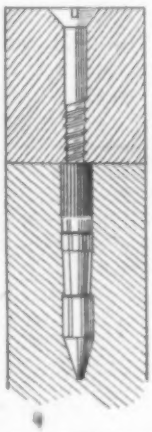


Projecting Image of Opaque Object on Screen by Putting Light Source Immediately in Front of It

the screen. The diffused rays from each point of the object pass through the lens and are projected upon the screen. No image of the arc, the reflector or the supporting members of either, is carried to the screen, because they are out of focus. In the accompanying drawing the wide end of the diagram represents the screen; the oval, the lens; the small curve, the reflector; the dot, the light source, and the short line, the object.

METAL SOCKETS FOR SCREWS USED IN WOODWORK

Threaded on the inside to receive a screw, a hollow brass pin, which may be driven into a piece of wood flush with its face so as to form a metal screw hole, is being made in different sizes capable of being used in practically all places where screws are commonly employed. One of the ideas back of the invention is to provide a permanent hole in order that a screw may be removed and replaced as many times as desired, without so



chewing the wood that the holding power of the screw is weakened, necessitating the plugging of the hole. It may be used in interior finishing, as for instance in attaching the cleats to a window sash, and in nearly all kinds of cabinetwork.

NOVEL MAIL-ORDER BLANK REQUIRES NO ENVELOPE

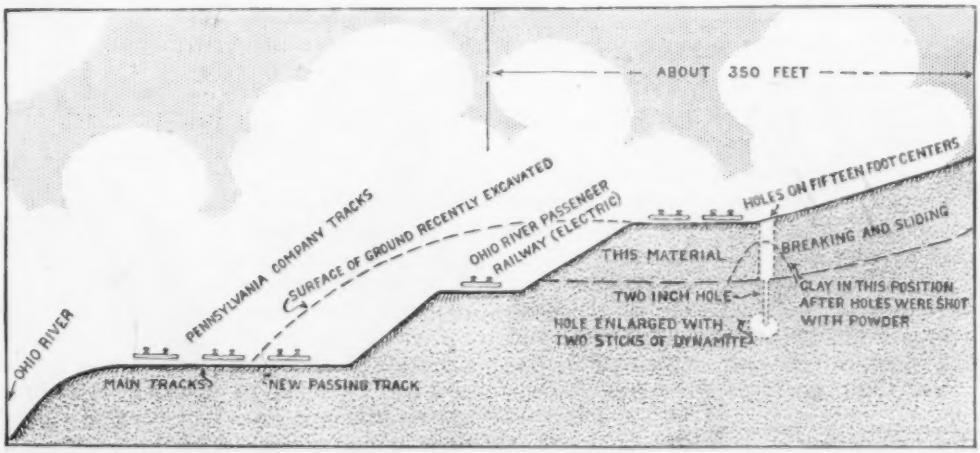
Designed especially for general mail-order purposes, an order blank which may be posted without the use of an

The Order Blank may be Folded into the Form of an Envelope and Sent through the Mails as Such

envelope has been introduced. Except for a gummed flap on the left edge, the sheet is the same in appearance as many ordinary forms. It may be folded, however, into the shape of an envelope, the face of which bears the printed name and address of the firm using it. It is employed as a convenience to customers in mailing special orders, and is not intended particularly for the use of company salesmen.

STOPPING A LANDSLIDE WITH EXPLOSIVES

Raising humps in the underlying stratum of fire clay by means of explosives was the novel and effective method used for stopping a slide that developed after a railway roadbed had been excavated along a sidehill in Pennsylvania. When the excavation was nearly completed there resulted a slide, 1,700 ft. in length, that extended back from the cut a maximum width of about 350 feet to the face of a rock cliff. About 40,000 cu. yd. of material in excess of that estimated for the excavation slid into the cut and was taken out by a steam shovel. An electric line that parallels the new track was practically put out of operation in spite of continual work of relining and resurfacing. Investigation showed that the sliding material was about 10 feet deep, and that it rested on a solid bed of fire clay which acted as a sliding plane. To cure the trouble, holes spaced about 15 feet apart, and big enough for a man to work in, were first excavated to the bottom of the moving mass. In the bottom of each excavation a 2-in. hole was then drilled


ABOUT 350 FEET
HOLES ON FIFTEEN FOOT CENTERS
BREAKING AND SLIDING
THIS MATERIAL
TWO INCH HOLE
HOLE ENLARGED WITH TWO STICKS OF DYNAMITE
CLAY IN THIS POSITION AFTER HOLES WERE SHOT WITH POWDER
SURFACE OF GROUND RECENTLY EXCAVATED
OHIO RIVER PASSENGER RAILWAY (ELECTRIC)
PENNSYLVANIA COMPANY TRACKS
OHIO RIVER
MAIN TRACKS
NEW PASSING TRACK

How the Humps were Formed by Explosives in the Underlying Clay Stratum to Stop a Landslide

10 ft. into the clay and the bottom of the hole was expanded by the explosion of two sticks of dynamite. This made a pocket large enough to hold three kegs of black powder. When these charges of powder were fired, a series of mounds were raised in the clay that acted as abutments for holding back the loose material.

STREET CAR CAN BE CALLED AT WILL WITH PUSH BUTTON

A city on the western coast has a street-car line which much resembles an elevator in an office building in operation. A prospective passenger arriving at either end of the road is invited by a sign to "Push the Button if You Want a Car." The "push" makes a car appear from somewhere down the line, much as an elevator responds to the same kind of call. Passengers are carried over a distance of half a mile, or more, by the car. The service was established by the traction company as a temporary expedient to carry passengers from one transfer point to another while a new bridge is being built over the old route. Only one man operates the lone car and his occupation will last six months, or more, before the bridge is finished.

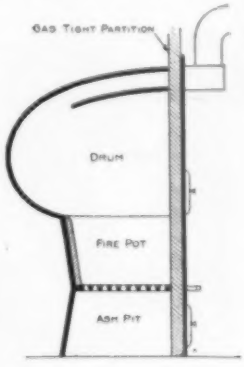
WRITING DESK AND TABLE FORMED BY TEA WAGON

Various household uses may be made of a combination tea wagon and portable table that has recently been brought out. It is provided with double drawers in which silver, linens, and other articles, are intended to be carried, and also has a sliding board suitable to be used in preparing sandwiches, cutting bread, or mixing salads. In addition to this it has two full-size shelves below the top. Instead of having a serving tray on the wagon, the top is divided into two sections which are so hinged that they may be folded over and form a table. By turning down only one leaf, however, a convenient desk is provided. When employed in this way, the tea wagon may be used in a living room, library, or bedchamber, books being kept on its shelves and writing materials deposited in its drawers.

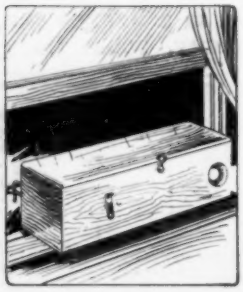
In Addition to the Ordinary Uses, This Tea Wagon may be Employed as a Table, Writing Desk, or Magazine Stand

GARAGE STOVE ELIMINATES GAS DANGER

A heating stove so arranged that no gases present in the room can come in contact with the flame has been placed on the market for use in garages and other buildings where there is danger from explosive gases. This is accomplished in a simple manner, the stove being set in a gas-tight wall so that it projects into the room and heats it by direct radiation, but with its feed door and all other openings through which gas might enter placed on the opposite side of the wall. The junction between the stove and wall is made tight to exclude the gases from the feed room.



NOVEL AND PRACTICAL THINGS FOR THE HOME



Night-Rain Alarm for Bedchamber

TO awaken the occupants of a sleeping chamber in case rain is driven through an open window during the night, an electric alarm has been constructed. The apparatus is contained in an oblong box, intended to be placed on a sill, and consists essentially of a battery, buzzer, small lamp, and switch. The latter is an exposed disk. When rain falls upon this the circuit is closed, illuminating the globe and operating the buzzer.

Novel Ring with Friendship Links

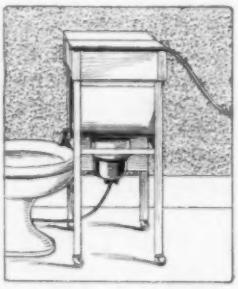
One of the season's odd fads is represented by a ring similar in plan to the friendship bracelet. It is made with a special band that may be opened and closed to permit the insertion of small gold segments bearing on their faces the monograms of their donors. When a complete set of the initialed links is provided the band is permanently locked.

Conveniently Lighted Toilet Mirror

Clamped to a toilet mirror, lately introduced, is a cylindrical reflector holding a tubular lamp that throws its light through a narrow, adjustable opening. The glass is mounted in a nickeled frame provided with folding legs. It is convenient for a woman's dressing table and may also be used by a man when shaving. The light is cast where it is needed, while the user's eyes are protected by a shade.

Luminous Bulb for Electric-Lamp Chains

To enable a person in the dark to find a "drop chain" attached to an electric lamp, a small, self-luminous bulb has been invented. This is intended to be fastened to the end of such a chain. It is made of a phosphorescent material and gives off a soft glow, easily seen in the dark.



Compact Power-Driven Washing Machine

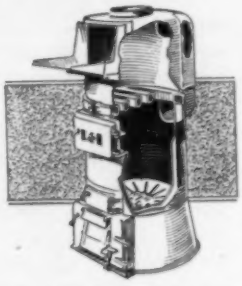
For the home in which there is a baby whose linen must be laundered every day or so, a small electric washing machine is made that may be used in a bathroom. It is compact, but also of generous capacity. With it, delicate dresses, lingerie, and other things, may be cleaned in about 12 minutes. Water is forced through the clothes instead of the latter being churned mechanically.

Serviceable Nut Cracker of New Form

Quite a novel cracker for pecans, filberts, almonds, and similar nuts, has been brought out which en-

ables the shells to be removed without crushing the kernels. The cracking is done by means of a screw instead of a hammer. It is finished in nickel.

Both convenient and economical features are contained in a combination water heater and garbage burner that has lately been designed for domestic use. The refuse chamber is located in the top of the device and the flue constructed to facilitate drying the refuse, which is burned by flames passing up from the fire box.

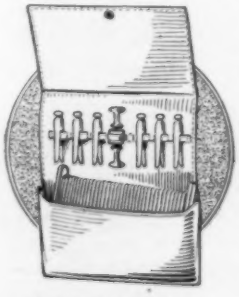


Garbage Incinerator and Water Heater

To replace the buttons and lacings used with footwear, spring fasteners have been invented. These consist of short spring links supplied with hooks at either end which slip into the eyelets of a shoe. One of the points claimed for them is that they provide elasticity where it is most needed and overcome the discomfort of tightly laced shoes.

Spring Links Used as Shoe Fasteners

Among the winter's novelties is a pocket clothesline outfit for women who occasionally wish to wash handkerchiefs, and similar articles, when traveling. It consists of six celluloid clothespins, a pair of glass-headed tacks, and a generous length of stanch cord packed in a folding leather case.

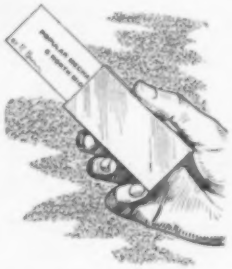


Clothesline Outfit for Woman Traveler

With a new dusting mop, shaped something like a flared "V," it is not difficult for a maid to get at dirt in the corners of a floor or about the legs of radiators and heavy furniture, such as a piano. It is made with a steel frame over which a cotton swab is slipped. The handle is fitted with a spring which holds it in a normal working position.

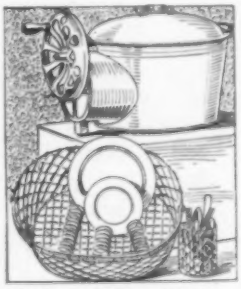
Floor Duster Shaped to Clean Corners

Made of metal and operated by a spring mechanism, an automatic card case has been devised which discharges a card through a narrow slit in the front end whenever pressure is applied against a small button provided on one side. It is large enough to accommodate about 50 business cards of the ordinary size and prevents them from being soiled while carried.



Odd Metal Case for Business Cards

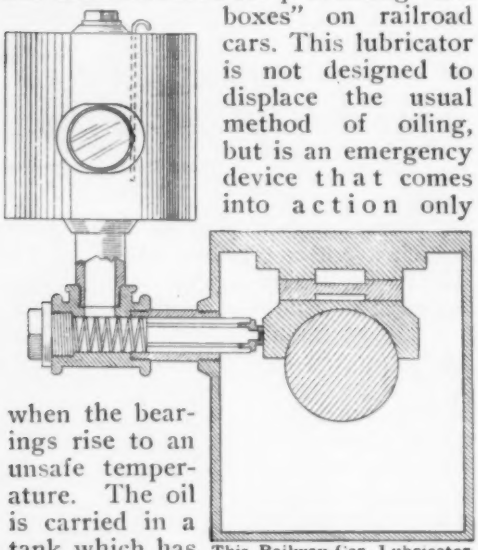
In an attempt to simplify kitchen work, a dish-washing machine suitable for the average household is being introduced. It is 18 in. long, 13 in. wide, and 10½ in. high, finished in porcelain enamel and fitted with wire baskets in which the dishes are placed. At one end of the device is a propeller which, when revolved, throws water over the dishes with considerable force. It may be operated either electrically or by hand.



Mechanical Dish Washer for Domestic Use

AUTOMATIC LUBRICATOR FOR RAILWAY-CAR JOURNALS

An ingenious automatic lubricator has been invented for preventing "hot boxes" on railroad cars. This lubricator is not designed to displace the usual method of oiling, but is an emergency device that comes into action only when the bearings rise to an unsafe temperature. The oil is carried in a tank which has an outlet tube with a perforated head. The perforated head bears against the brass bearing through the action of a spring, and is normally filled and the perforations closed by a metal that fuses at a low temperature. When the bearing begins to run hot, this metal melts and flows out of the head, leaving the perforations clear, and the oil flows from the tank into the journal box. In order to preserve the oil and at the same time prevent the formation of a vacuum when the tank discharges, an air intake is provided that runs from the top of the tank down to a point well below the surface of the oil. After each action the tank must be refilled and a new supply of metal placed in the perforated head. A glass gauge on the tank shows at a glance whether the tank is full or empty.



This Railway-Car Lubricator Fills the Journal Automatically with Oil When the Bearing Begins to Run Hot

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¶In accordance with a government decree recently issued, the German language will in future be used exclusively in conducting the business of the Austrian state railways.

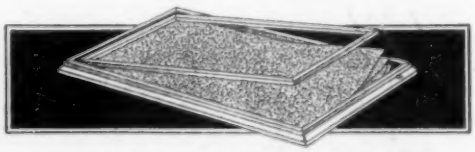
SCARCITY OF PLATINUM HAMPERS JEWELERS

Owing to an embargo the allies have placed on platinum, and similar metals, jewelers in this country are finding it difficult to obtain a sufficient supply. Iridium, a metal used to harden platinum, was recently quoted at $70 an ounce, the statement being made that only 2,000 oz. of the material are to be had at present in the entire country. Platinum has been selling at $56 an ounce, and palladium at $50 an ounce.

The allied governments persistently refuse to allow the metals to leave their countries. This, according to men in the trade, is apparently due to the value the metals have in industrial processes much used at present on account of the war's demands. Then, too, it is thought that Germany probably needs a great deal of the metal, and the allies refuse to allow it to leave their hands because of the possibility of Germany securing it. The principal supply comes from the Ural Mountains in Russia, though this, too, has fallen off because of the miners having quit work to join the armies. If the war and the embargo continue much longer there is likely to be a genuine shortage of the metals in this country, in the belief of leading importers.

DRIP PAN FOR MOTOR CAR MADE OF OILED PAPER

Among the motor-car accessories recently invented is a drip pan, which, when placed beneath a machine, prevents grease and oil from dropping on a garage floor and is also so designed that it may be kept in a clean-looking condition itself without trouble. It consists of a wooden frame which



Convenient Drip Pan for Motor Car Which may be Kept Clean

holds a block of oiled paper. When the top sheet becomes coated with grease and dirt, the edge of the frame may be lifted and the leaf removed. This leaves a new, clean surface exposed.

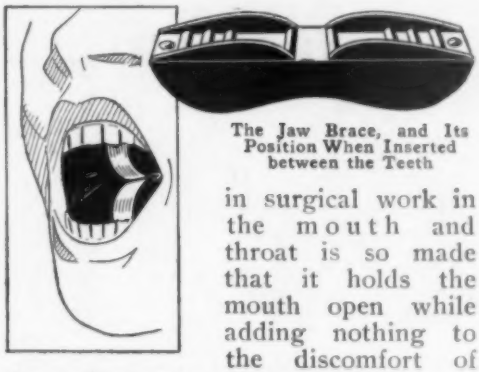
MINERAL POTASH EXTRACTED FROM ALUNITE

The discovery of mineral potash in commercial quantities in an alunite deposit in Utah, together with a practical method of extracting it, as recently announced by the United States Geological Survey, is confidently expected to relieve agriculture in this country of the severe handicap from which it has suffered since the outbreak of the war and permanently to do away with the necessity for importing this material, which is essential both as a fertilizer and as an ingredient of high explosives. The vein on which the experiments have been made is located in Piute County, Utah. It is 10 ft. wide, has been traced for a distance of 3,500 ft., and is of unknown depth. Similar veins of alunite are known to exist in Colorado, Nevada, California, and Arizona, and present indications are that the supply of potash from this source is practically inexhaustible. How important this discovery may be is indicated by the statistics for 1913, during which year potassium salts to a total value of $15,000,000 were imported from Germany. The imports of potash have been almost entirely cut off since the outbreak of the war.

¶ Limousines with all-glass roofs are among the novelties soon to appear in the larger cities, according to those familiar with advanced practice in automobile design. Such vehicles have already gained marked popularity in Germany, where the material "cellon" instead of glass is used for the roofs. This remarkable substance greatly resembles glass in its general properties, but withstands rough handling much better.

JAW BRACE FOR DENTAL AND SURGICAL WORK

A rubber jaw brace that has just been brought out for use in administering anesthetics in dental work and



The Jaw Brace, and Its Position When Inserted between the Teeth

in surgical work in the mouth and throat is so made that it holds the mouth open while adding nothing to the discomfort of the patient. It conforms to any mouth, and one of its advantages is that there is no danger of its slipping down the throat, as it flies out of the mouth the moment it is released. In adjusting it, the ends are brought together between the thumb and finger, and the brace is placed between the teeth on one side with the ends to the front. It occupies a small space and leaves sufficient room for the operator.

BARBED STEEL ANCHOR MADE WITHOUT LOOSE PARTS

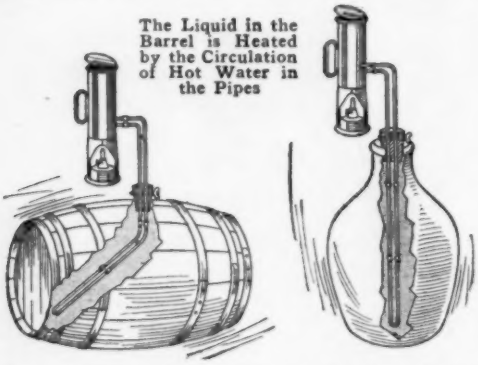
Made without loose parts so that it may readily be driven into the ground, a new guy anchor has been invented which consists of a straight, ⅞-in. square steel bar, approximately 5 ft. in length and fitted near the pointed end with two sets of bent spring barbs. The opposite end is provided with a 1-in. eye for receiving the cable. The

Steel Guy Anchor That may be Driven into the Ground Readily

barbs are riveted to the rod and reinforced by short backing members. The weight of the anchor is approximately 20 pounds.

NOVEL HEATER FOR STORED LIQUIDS

A simple heating apparatus has been brought out in France for heating liquids that are stored in barrels,



The Liquid in the Barrel is Heated by the Circulation of Hot Water in the Pipes

or other containers, and are likely to freeze or become too stiff from the cold to flow readily. The apparatus consists of a small water-filled tank, heated by a spirit lamp, with a U-shaped pipe extending down into the container and having both ends connected with the tank. When the water in the tank is heated it flows down one leg of the pipe and back to the tank through the other leg, maintaining a constant circulation of hot water.

MOTOR CAR WELL FITTED FOR LONG JUNKETS

Few cars are more fully equipped for touring than one driven by a Michigan motorist who does much overland traveling. It is a six-cylinder, seven-passenger machine that has been fitted with many ingenious and utilitarian devices which make it a veritable camping outfit on wheels.

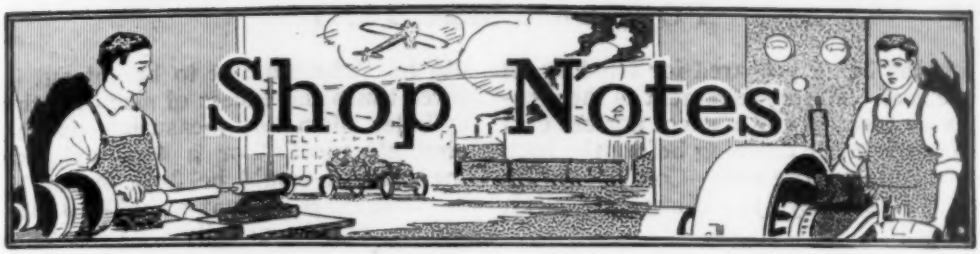
It is provided with very complete cooking facilities, has hot and cold running water, a disappearing dining table, a refrigerator capable of holding enough provisions for two days, a double hammock bed, and abundant storage space. With these accessories the tourist may travel for hundreds of miles in comfort without planning his itinerary to include towns with good hotels for night stops.

The dining table is fitted to the top and back of the front seat. Beneath this is a refrigerator which is drained through the floor of the car and only requires re-icing every 30 hours. The luncheon kit is of the suitcase type and includes vacuum bottles, all necessary dishes for serving several persons, and silverware. A dust-proof trunk is carried on a baggage rack at the rear. This is of sufficient size to hold three suitcases, thereby eliminating the discomfort which comes with crowding the tonneau. On the left running board is a special tool box in which various accessories, including a rubber vulcanizer, are packed. The tires are pumped and the upholstery cleaned by means of a four-cylinder pump permanently mounted with the motor.

When driving through city streets a small electric warning signal is used, but on country roads a powerful marine horn is employed. The car naturally is equipped with an electric starter and lights. In addition to the usual lighting equipment, however, there is a dome lamp for illuminating the interior of the machine at night when a stop is made and it is desired to read or write. Roller shades that may be operated from the driver's seat dim the headlights for city use, while a green pilot lamp, mounted on the left fender, assists approaching motorists to pass safely on narrow roads at night. A searchlight is also attached to the windshield on the driver's side of the car.

A hammock bed is designed to be hung lengthwise of the car above the seats. The right half of this may be set up so that one person may sleep while the car is driven by another. A lavatory is provided on the left running board, as well as a dish washer. A cold-water tank contains water for drinking and cooking purposes, and also supplies the radiator.

¶Motion pictures of British fleet maneuvers were recently taken under auspices of the admiralty. Half of the proceeds from display of these pictures will go to naval charities.



Protecting the Surfaces of Enameled Road Signs

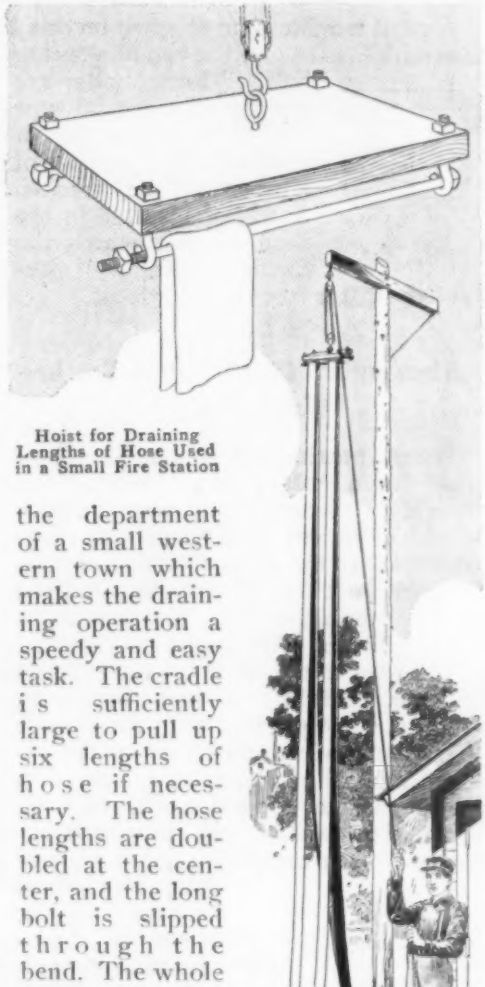
The use of enameled road signs is becoming very popular, but a great deal of trouble is caused by boys throwing stones at the signs, which chip the enamel from the iron surface. I have found a remedy that has ended the trouble in this locality and saved many dollars, for the signs are expensive. This simple remedy, while not hindering the reading of the signs, will effectively protect them from serious injury if they are hit with a hard object. On the back of the sign at the top and bottom, holes are drilled, and supporting brackets are attached to hold a thin mesh wire over the face of the sign. This will protect the sign, and answers the purpose better than anything that has been used.—Contributed by C. H. Thomas, Kennett Square, Pa.

Thawing Frozen Water Pipes

When the water freezes in the pipes of a house and the location of the frozen part is known, fill a water bag with hot water and place it on the frozen part, open the faucets to give vent, and before the water in the bag becomes cool the frozen part will be thawed out and the water running. This method has been used to advantage several times, and there is no danger of starting a fire as when using a gasoline torch.

Hose Drainer for Small Fire Stations

A great many laborious methods are sometimes employed to drain the hose of small fire stations before winding them on the reel for the next emergency. I have seen them pulled over rafters, shafting, and any projection which afforded a drop sufficient to drain the water out. The sketch illustrates a neat arrangement employed by



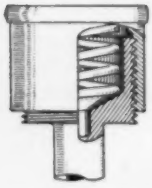
Hoist for Draining Lengths of Hose Used in a Small Fire Station

the department of a small western town which makes the draining operation a speedy and easy task. The cradle is sufficiently large to pull up six lengths of hose if necessary. The hose lengths are doubled at the center, and the long bolt is slipped through the bend. The whole number is then raised at once. When lowering them, the ends are carried out and laid flat, the entire number of

lengths being prepared for winding on the reel. The arrangement is inexpensively erected, and it saves a great deal of work in the draining before the hose is wound on the reel.—Contributed by F. W. Bentley, Jr., Missouri Valley, Iowa.

Preventing the Loss of Spring-Bolt Caps

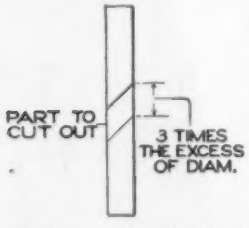
A most troublesome accident on one's automobile is to lose the cap of a spring bolt. These bolts are usually of a special type and carry a reservoir of grease for the purpose of lubricating the shackle. A spring inserted in the head against which the cap is screwed will prevent the latter from coming loose.



Figuring Width of Slot to Cut in Piston Rings

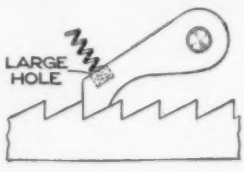
When turning up a set of piston rings for a gas or steam engine, the "blank" is turned larger than the bore of the cylinder; then when the rings are cut off to the proper width a certain portion is cut out of each ring, and the ring is sprung, closing the gap, to fit in the cylinder. The spring thus created in the ring causes it at all times to fit the cylinder tightly and make the piston gas or steam-tight under all conditions.

To the novice, and to many experienced men, the amount to cut out of a ring is a matter of guesswork, although a simple calculation will reduce the uncertainty to a certainty. As a general rule, blanks are turned ¼ in. larger in diameter than the cylinder for every foot, and proportional amounts for smaller cylinders; a blank for a 12-in. cylinder being 12¼ in. in diameter and a blank for a 6-in. cylinder, 6⅛ in. The amount to be cut out is three times the excess of size over the cylinder diameter, measuring on the circumference. For a 6-in. cylinder the amount would be 3x⅛ in., or ⅜ in. The exact amount would be 3.1416 x⅛ in., or .392, or fully 1/64 more than stated, but it is better to cut just three times, and leave the excess for filing off the rough edges left by the saw cut, and allowing sufficient metal to make a nice, close fit of the ends.



Recesses for Coiled Springs

In a certain hardware article a pawl was made to engage a rack, and was held by a coil spring set in a hole in the back of the pawl. The hole was drilled ¼ in. in diameter, or .01 in. larger than the spring. So much trouble was experienced by the spring working out that the sale of the article was seriously affected, and yet, for certain reasons, the construction could not be changed. A tighter fit for the hole was tried, but each degree of tightness, while it lessened the trouble, reduced the resiliency of the spring. Purely by accident a gross of the pawls were put in with a hole 3/32 in. larger, and strange to say, no spring came out. As the adopted construction it proved a success.



To Keep Hot Water Constantly at the Faucet

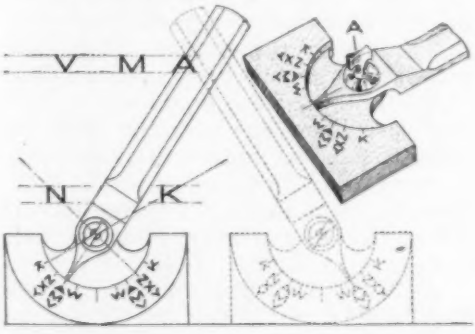
Some hot-water tanks are installed in the basement where they are connected either with the furnace or with a gas heater. When the water is drawn, it is necessary to let it run for a time until the hot water comes. To overcome this, I continued the pipe from the faucet back to the tank, making the connection at the lower part. This will keep the water in the pipe in motion and thus keep the hot water at the faucet and prevent the waste every time hot

water is wanted. I also put the hot-water pipe alongside the cold-water pipe to keep the latter from freezing. Where the pipe ran under the house, I cased it with boards to keep the heat in from the hot-water pipe.—Contributed by F. J. Schellhase, Mount Healthy, Ohio.

A Lettering Instrument for Draftsmen

The illustration shows a device to take the place of the lettering triangles and templates. The tool is constructed entirely of wood, cherry preferred—excepting, of course, the screw A—and is so simple that very little description is required. Its method of operation is also apparent. The tool is designed for plain Gothic letters, although the head may be graduated for any style of letter, or for two or more styles.

The tool reads right and left, as shown, and possesses a far greater range than any triangle, or lettering template, in sizes of letters, since the blade can be made to telescope, so that by extending it, large sign letters can be formed with it. From the small size shown it is possible to make all letters on drawings from the large to the small, ⅛ in. high, used on drawings. The tool is very much neater in appearance than the standard lettering

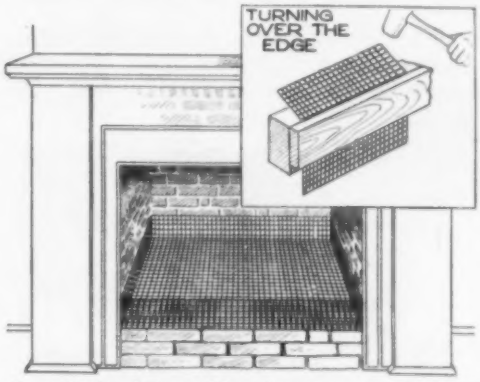


An Instrument to Take the Place of the Lettering Triangles and Templates Used by Draftsmen

triangles or templates, and occupies less space than the several triangles it replaces.—Contributed by J. B. Murphy, Plainfield, N. J.

An Emergency Fireplace Grate

As usually constructed, fireplaces are built for wood only, and cannot be used for coal unless especially provided with



Grate Made of Coarse-Mesh Screen, to be Used for Coal in a Wood-Burning Fireplace

a suitable set of grates, which for the particular size and style of a fireplace might not be available. A removable grate for such an emergency can be made of woven wire screening, of about ¼-in. mesh and of ⅛-in. wire. Most any piece of screen, such as is scrapped from a gravel screen, will answer the purpose, providing it has no hole that would allow the coal to drop through.

In laying out the screen preparatory to bending up the edges, as shown in the illustration, it is best to make a wood template which easily fits the fireplace. This shape can be marked off on the wire, leaving about 2 or 3 in. for bending up at the sides and ends. This border strip is cut at the corners to allow for the turning up of the edge. To turn the edges, fasten the screen to a beam, or the workbench edge, with a board on the outside, then beat the projecting edge over with a hammer.

The screen grate, when finished, can be supported with brick laid around the outer edges and on the floor of the fireplace, with one brick in the center, to prevent sagging under the heavy weight. The ashes can be removed in the usual manner from underneath the grate by means of a shovel. For appearance, and to prevent ashes from

falling out, a temporary row of brick can be set up in front of the grate.—Contributed by F. W. Buerstatte, Pullman, Wash.

A Washing-Machine Water Heater

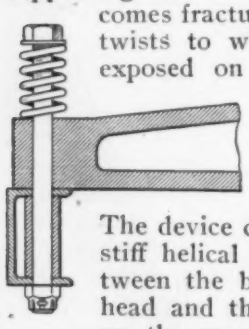
The illustration shows a simple homemade attachment for a washing machine, to keep the water hot. As

The Water is Heated and Kept Hot in the Machine All the Time While Washing

may be seen, the heating unit consists of two ¾-in. pipes, one return bend, two unions, and two close nipples, which are screwed into the sides of the machine. The stove is a single-burner hot plate. The unions permit the ready dismantling of the pipes in case they become clogged with dirt. This attachment, fitted to a power machine, lightens the work considerably.

Flexible Holding Means for an Automobile-Engine Bed

It happens quite frequently that a supporting arm of a truck engine becomes fractured, due to sudden twists to which the frame is exposed on rough roads. A good method of fastening the engine of an automobile is shown in the sketch. The device consists of a rather stiff helical spring, placed between the bottom of the bolt head and the top of the boss on the supporting arm. The spring takes up the twists and strains given to the frame as the car passes over rough roads.



How to Make an Aluminum Screen for Moving Pictures

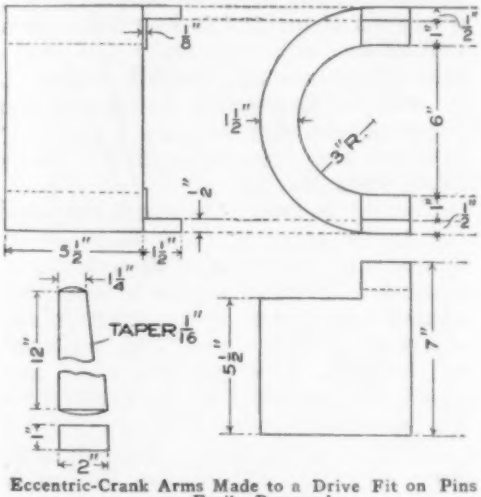
In making an aluminum screen for moving-picture theaters, the amateur will find it a difficult job if he tries to apply the aluminum paint with a brush, as it dries too quickly for the inexperienced to put it on without making laps, and laps mean that veil effect that must be avoided if clear pictures are desired.

A simple way in which an amateur can make a first-class screen is as follows; the description being for a screen 8 by 10 ft., but the size can be varied to suit conditions. First make a light frame of wood to hold the cloth, then shrink the goods by washing it in alum water. A handful of alum to a 2-gal. pail of water makes the solution. When the cloth is dry, tack it on the frame, making sure that it is stretched tightly and without wrinkles. To make a neat job tack about every 4 in. The filler consists of 1 gal. linseed oil; 1 pt. japan drier, and 6 lb. of white lead. Stir until well mixed and apply with a brush, giving the cloth a second coat after letting the first dry 12 hours. When the second coat is dry, which requires about 16 hours if the room is moderately warm, it is ready for the aluminum, or bronzing, liquid. This is the proper condition of the cloth for either method. This size curtain will require ½ gal. of bronzing liquid, and if it cannot be readily obtained, use varnish slightly thinned with turpentine. Place the screen face up on horses, or on four chairs, and pour the liquid on it. Tilt the screen first one way and then the other so that the liquid will cover every part of the face, or smooth side. Sprinkle on aluminum bronze all over the screen before the liquid dries. Tilt the screen as before, and it is well to shake it also so that the bronze will be distributed over the surface. Place the screen on the horses, as level as possible, and let it lie until dry, which will require about two hours. Then stand the screen up on edge and tap it lightly on the back to jar off any loose bronzing powder. This will produce a screen without a lap or any veil effect. It is

the only method by which anyone not familiar with the different kinds of paints can handle a screen with the desired effect, leaving out the streaks and laps.—Contributed by Claude O. Soots, North Salem, Ind.

Removing Locomotive Crank Arm Easily

When a main rod of an engine equipped with a valve gear has been taken off, the side rod cannot be removed until the crank arm is taken from its place. A great many locomotives with such valve gears have the crank arms, which fit in a bored-out portion of the crank pins, a drive fit and kept tightly in place with a long bolt through the crank pin. These crank arms are very difficult to remove, and for this reason the device illustrated was designed to make the work easy, and it gives entire satisfaction. The device is placed on the pin, and the wedges are driven in to remove the



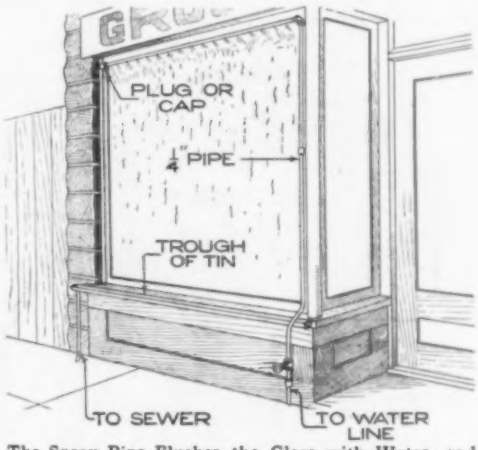
Eccentric-Crank Arms Made to a Drive Fit on Pins are Easily Removed

crank arms. The lugs are provided to keep the wedges from working out and away from where they are most effective.—Contributed by Joseph K. Long, Renovo, Pa.

¶Do not screw pipe together for either steam, water, or gas without putting white or red lead on the threads.

Spraying Pipe for Washing Windows

A local merchant in a small town had some difficulty in washing the plate-



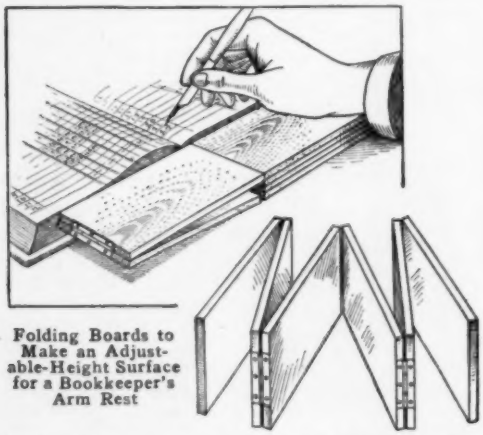
The Spray Pipe Flushes the Glass with Water, and the Drain Runs It to the Sewer

glass windows. One or two pedestrians accidentally stumbled into the bucket of water which the clerk was using to flush the window glass. The difficulty was overcome very nicely, by him and by many other merchants, in the following manner: A pipe perforated with small holes was run along the top of the window, and one end of the pipe was connected with a valve to the city water main inside of the store. At the bottom of the window a small tin trough or eave was run, one end of which emptied into the sewer drain. The water was turned on from the inside and a small valve was put in on the outside, to control the flow. The window was at once flushed with clean water, but at the same time without the necessity of handling a heavy pail and a splattering swab. All the work necessary was to dry the pane with the thin rubber blade for that purpose. The convenience of the arrangement was well worth the time and expense.

¶The minute specks sometimes seen on mahogany piano cases are caused by oil that exudes from the wood. Shellac varnish will not hold it back. The only cure is to rub it down and revarnish.

Hand Rest for Bookkeepers

The one disadvantage of the ordinary arm rest for bookkeepers is that its surface is too low for comfort.

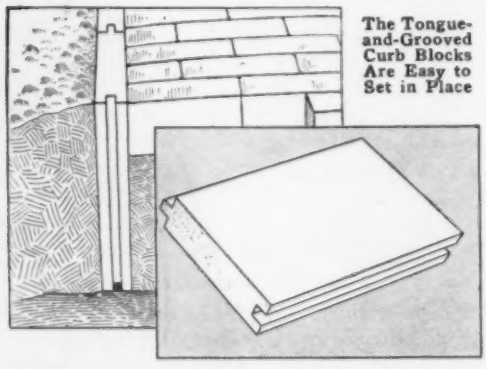


Folding Boards to Make an Adjustable-Height Surface for a Bookkeeper's Arm Rest

When its end is placed between the book pages the rest part is not level with the page on which the entry is to be made. This difficulty is entirely overcome by making a series of thin boards, the width desired for the rest and as long as the book page is wide. These are hinged together at the ends so that they will spread out similar to a hearth screen. It is easy to stack them for the proper height.

Curb Blocks for Road Pavements

In making paved roadways in the country, and especially in sandy soil, there is no necessity for having a curb



The Tongue-and-Grooved Curb Blocks Are Easy to Set in Place

with a gutter. The curb should be merely a support for the paving edges or blocks and a protection against damage by the vehicle wheels. One municipality, where it was necessary to build a paved roadway in sandy soil, used an interlocking curb block that was tongued and grooved, the blocks being about 24 in. long, 18 in. deep, and 4 in. wide, made of concrete. These blocks were set in the soil on the curb line so that their upper edges were level with the tops of the paving blocks. The shape of the block and the manner in which it is placed in the earth are clearly shown in the illustration.

Making Teeth for Gear Patterns Quickly

The making of teeth for gear patterns is always a tedious job, and when they are worked out one at a time, no matter how carefully they are laid out or how skillful the workman, the results are seldom satisfactory. With the use of the jig shown in the sketch and a correctly made sanding cylinder, hundreds of teeth may be made which will all be duplicates, and if the directions given here are carefully followed, it will be impossible to detect the slightest variation in size or contour between the first and the last tooth taken from the jig.

The jig is made the exact shape of the tooth required, but 3 or 4 in. longer, and with more than 1 in. of stock below what would be the root circle of the gear. It should be made of a piece of hard wood. This is planed up straight, with parallel sides and edges, and with the ends smoothed up for laying out the teeth. The laying out and working to the lines must be done very carefully. After the block is finished, the space for the tooth blank is cut away, and two screw holes are drilled to hold the blank in place during the finishing process. The projecting piece on the end of the jig is securely fastened with glue and a couple of brads. It should project about ¼ inch.

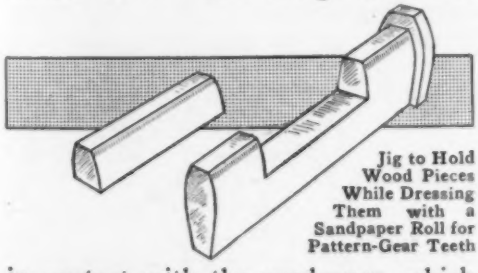
For the sanding cylinder, turn up a piece of hard wood, 2½ or 3 in. in

diameter, and 1 in. or more longer than the jig. It should be the same diameter and perfectly straight from end to end. In the center a groove is then turned, about ¼ or ⅜ in. longer than the tooth blank, and of a depth slightly greater than the thickness of a piece of No. 2 sandpaper. The object is to fill the turned-out portion with sandpaper and still have a cylinder that will be perfectly straight from end to end. The sandpaper is cut in narrow strips and wound around the cylinder like a helix, fastening it with glue as the winding proceeds.

A groove is then turned to take the raised, or projecting, piece on the jig, and it should be so located that the tooth-blank space will come directly over the sandpaper-covered part of the cylinder, with the sandpaper projecting ⅛ in. or more beyond the space at each end.

The tooth-blank stock is cut the exact length of the tooth, and should fit snugly in the space in the jig. The bottom of each tooth is first planed with a round plane to fit the root circle of the wheel, and the flanks are roughly shaped to the tooth outline.

The operation of this device is as follows: The sanding cylinder is put on the lathe centers and the belt thrown on; the jig with a blank in place is taken in both hands and held on the revolving cylinder with the projecting piece running in the groove turned for it. This brings the blank



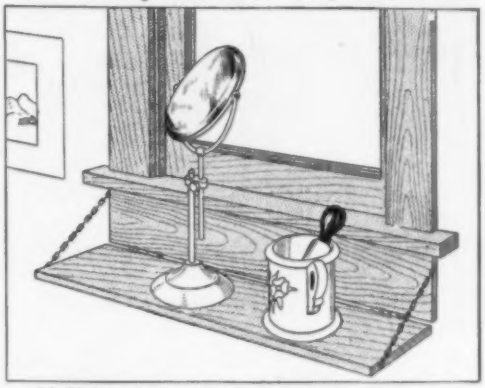
Jig to Hold Wood Pieces While Dressing Them with a Sandpaper Roll for Pattern-Gear Teeth

in contact with the sandpaper, which rapidly grinds it flush with that part of the jig that is in contact with the smooth ends of the cylinder. The jig is rocked back and forth while grinding, and the groove and projecting piece keep it perfectly parallel with the axis of the cylinder.

Teeth for bevel wheels are made just as easily as for spur gears, and the same idea may be applied to many articles of woodwork that are to be duplicated many times.—Contributed by J. A. Shelly, Brooklyn, N. Y.

A Folding Shaving-Material Shelf

A simple and useful shelf upon which to place a mirror, and other



Shelf Attached to the Facing under a Window to Hold Toilet Articles While Shaving

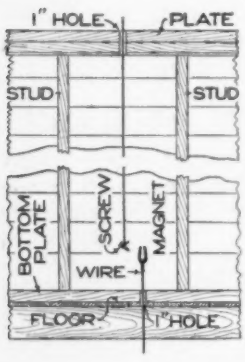
toilet articles, while shaving, can be made as follows: Procure a board, ½ in. thick, and of the same length and width as the facing under the sill of the bathroom window, and fasten it to the lower edge of this piece with two small hinges, as shown. Support the ends with two pieces of small chain to hold the shelf at the right level. The position of the shelf affords a fine light, and if it is given the same finish as the woodwork of the bathroom, it will not be noticed when it is folded up.—Contributed by Frank L. Matter, Portland, Ore.

Antirust and Fireproof Paint

A good antirust paint for structural work is made of red lead, 60 lb., zinc white, 30 lb., and graphite, 10 lb.; all ground in raw linseed oil. The addition of some china clay will prevent too rapid drying. To make a good fireproof paint use the preceding formula and add to it ½ lb. of boracic acid or sal ammoniac.

Fishing Electric Wires into Walls

Having occasion to run an electric wire down between the plastering of a wall where the holes through the plate and the floor were not plumb, I tied a small iron screw to a line I let down through the ceiling-plate hole, and after feeling it hit the bottom I drew it back up about 1 ft. A small magnet was tied to a stiff wire and inserted through the floor hole, and I was able to attract quickly the hanging screw, which was easily drawn through the hole.—Contributed by Ed. Kresko, Port Jefferson, N. Y.



To Keep a Boot from Rubbing the Heel

To keep a boot that is rather loose from rubbing the heel and wearing the sock, take a piece of soft leather, about 15 in. long and 1½ in. wide, and prepare it as follows: Fasten a buckle on one end, and punch two or three holes in the other end for the buckle tongue. Cut a slit in the leather, beginning about 1 in. from the buckle and ending within 7 in. of the other end. Part the two pieces, slip the heel

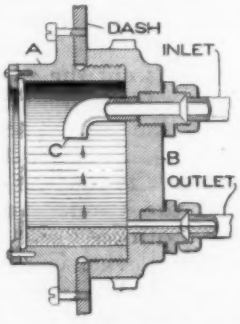
into the opening, pass the other end over the instep and buckle it on the outside. — Contributed by Maurice Fischer, Mokelumne Hill, Cal.

Care of Automobile Springs

Many motorists do not give the attention to the car-body springs necessary to keep them in good condition. These springs need oil the same as any bearing on the car. Many cheap devices are on the market for opening the springs so that oil or graphite can be inserted, and this attention should be given at least every six months if the car is used regularly. The springs should be taken apart and polished once every year, and thoroughly greased before being put together.

A Homemade Oil Indicator

An oil indicator placed on the dash of an automobile is a most desirable feature, since the driver can immediately tell whether the lubricating system is operating properly, and thus many times burned-out bearings will be avoided. The car I owned had no indicator, and I decided to construct one, which resulted in the one illustrated made from parts picked up around the garage.



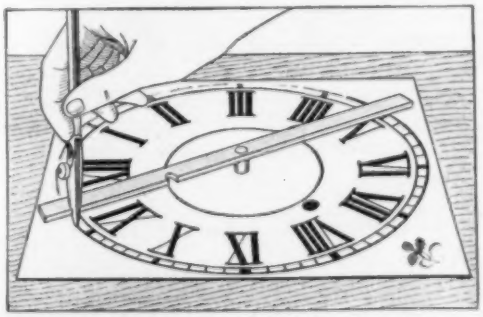
The body A of the indicator was made from an old hub cap, turned down on the inside and faced off on one edge, as shown. The cover B was made of an old adjusting nut of a clutch. Connections to and from the indicator were made by means of ordinary brass couplings, the upper, which is the inlet, being connected to a small pipe C for the purpose of leading the oil into the indicator. A glass cover is placed at the front of the instrument, as shown, which is held in place by means of a metal ring and small machine screws. The indicator is fastened to the dash in the manner shown, two machine screws being used to prevent it from turning and becoming loose.—Contributed by Adolph Kline.

Keeping an Oil Hone True

A simple way to keep an oil hone true and in good cutting condition is as follows. Wet a sheet of No. 1½ sandpaper and lay it, sand side up, on a flat surface, iron preferred. Rub the cutting face of the hone on the sand surface until it is true and flat. Next rub the face of the hone with another oil hone. This will remove the grit, or sand, imbedded in the surface, which is most important. Finish by holding the face of the hone on a revolving sand grindstone while plenty of water is applied. This will tone up the cutting qualities.

Marking Circles on a Clockface

In restoring an old clockface I used a mechanical aid to mark the circles bounding the hour numerals. It consisted of a wood arm pivoted on the post that holds the hands, and notched at two points to hold a ruling pen. For the sake of balance, the arm should extend for an equal distance on each side of the center. I found it much easier to make perfect circles in this way, as a ruling pen insures an even thickness of the lines and leaves no marks where they meet if the circles are drawn in sections. The old enamel

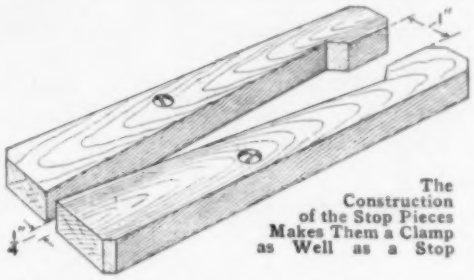


Drawing New Lines on an Old Clockface with the Aid of a Ruling Pen

surface took the drawing ink nicely after it had been washed with a weak solution of ammonia in water. The face was varnished after the marks were restored.—Contributed by James M. Kane, Doylestown, Pa.

A Bench Stop That Clamps the Work

The stop consists of two oak or maple blocks, about 6 in. long and ⅞ in. thick, cut in the shape shown and fastened to the bench top with screws through their centers. They are so set that the opening toward the work will be about



The Construction of the Stop Pieces Makes Them a Clamp as Well as a Stop

1 in. A board will be held firmly when it is pushed into the stop. The harder the work is pushed in, the tighter it will be held.—Contributed by T. S. Hastings, Detroit, Mich.

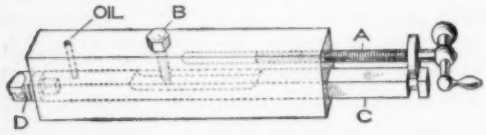
Beveling and Chamfering Tool for a Lathe

A simple little tool which is very efficient within its range is shown in the illustration. The tool is designed to be carried in the machinist's tool chest as a part of his equipment. This tool is to take the place of the compound rest on the various machine tools where such a rest is not provided; in fact it is a miniature compound rest.

While this tool may be set at any angle by means of a protractor, its chief work is short chamfers, such as lathe, and other, centers; valves, taps; the ends of reamer blades, etc., where it is especially convenient. The travel of the tool, operated by the feed screw A, is 1 in., and this will not cause enough overhang to make the tool chatter, if ordinary care is used in its operation.

The screw B is recessed into the tool holder C, and acts as a guide to prevent the tool from turning under the cut. The shank square D of the turning tool is a tight push fit in the tool holder C. The tool holder must be a firm running fit in the casing. The

whole arrangement is set in the tool post just as an ordinary tool. If it is to be used on a very small lathe, or

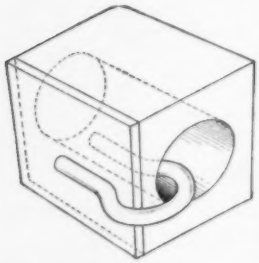


Screw-Feed Chamfering Tool to Fit in the Tool Post of a Lathe, Planer, or Shaper

other machine where the tool post is too small, it may be clamped to the tool-post block.

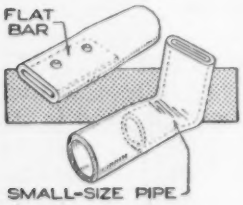
Clamp for Inaccessible Places

It often happens, when it becomes necessary to patch a piece of work, or part of a machine, worn out or otherwise damaged, that the place to be repaired is quite inaccessible for a clamp to hold the patch while drilling the rivet-pin holes. A piece of steel rod bent as shown, close enough to give it a spring clamping tension, overcomes the difficulty admirably.—Contributed by R. Hollis, Chicago.



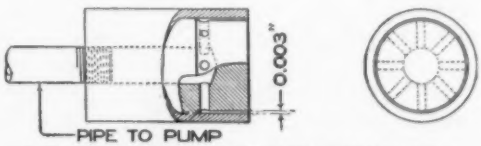
Reinforcing Flattened Pipe Ends

Ordinary wrought-iron pipe, used as structural material for railings, knee braces, etc., is very desirable, because of its light weight and relatively great stiffness. It suffers from lack of strength at the flattened ends, however. These may be greatly improved by inserting a piece of pipe the next size smaller, or a flat bar of steel before flattening the metal.—J. J. O'Brien, Buffalo, N. Y.



Nozzle for a Fine Spray

For the purpose of coating a certain hardware specialty it was desired to pass the article before a fine spray, the spray to be forced by a power pump. It was also desired that the spray should come through a row of holes, about .003 in. in diameter, and extend in a straight line 1½ in. long directly across the path of the work. When it came to drilling the holes, it was found that a satisfactory spray could not be secured in this way. In the first place the holes were not close enough together, they would fill up, and some holes would blow more than others. The scheme finally hit upon was to run the pipe into the end of a piece of cold-rolled steel, 1½ in. in diameter, drilled and tapped to receive it. This hole was 2 in. deep, and at that depth four smaller holes were drilled crosswise, making eight outlets. The piece of steel ex-



A Fine Spray, That will Not Clog, Obtained from an Annular Opening in the Nozzle

tending from the row of holes to the end was turned down, or reduced, .006 in. in diameter, and over the whole was pressed a piece of steel tubing having an inside diameter of 1½ in. This made an annular space .003 wide and covering the path of the work, 1½ in. wide, which gave a good spray.

Squaring a Planer Vise

Clamp a long straightedge in the vise, and then it is an easy matter to measure from the straightedge to the edge of the planer table with a 2-ft. rule and get it square quickly. In shops that are kept up, this method is not used much, on account of using the tongue-and-groove in the bottom of the vise to fit in the planer slots, mostly used in small repair shops.—Contributed by W. E. Butler, Wausaukee, Ill.

BUILDING A HOME

By Geo. M. Petersen

PART X—Built-In Features

IN this day of modern invention it is possible to get built into a home almost anything which may be desired, such as refrigerators, wall safes, wall beds, and so on. While many of these so-called "specialties" are unnecessary, or even useless, there are a large number that are almost invaluable.

Many a housewife has had to lose an hour or two in the morning waiting for the iceman when she could have been doing her marketing and getting the "loose ends" picked up so that she could have the afternoon to herself. Also it is often the case that the iceman comes just after the floor has been scrubbed and tracks it all up. In modern building practice this ice problem is solved very nicely. The refrigerator is built into the house so that it is not necessary to enter to deposit an ice cake, as this is put in through an icing door from the rear porch, from the sidewalk, or from a small platform built for the purpose. The ice water is conveyed from the refrigerator to the house sewer so that there is really no inconvenience at all.

From an economic standpoint it is doubtful whether the built-in or outdoor-icing refrigerator is of much advantage, but it is sure that the expense

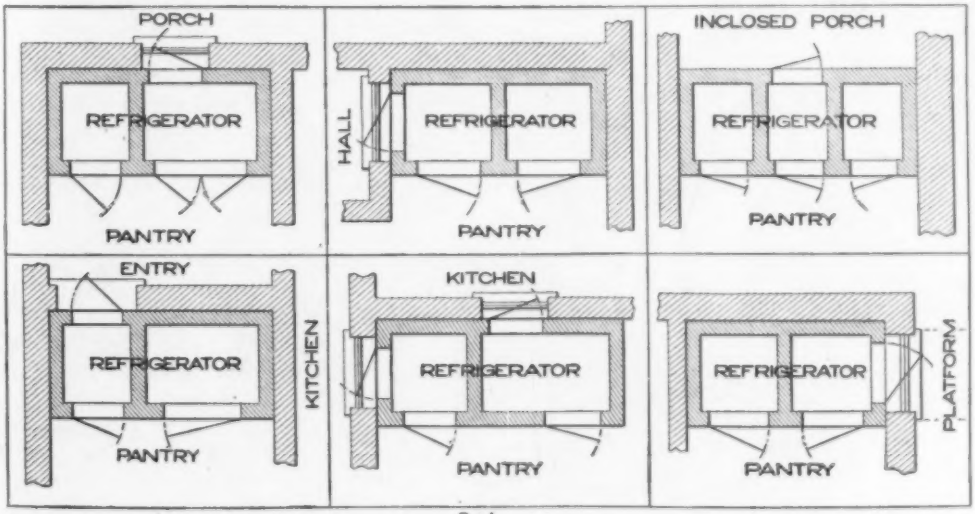


FIG. 1

The One Main Object When Locating the Position for a Refrigerator of Any Kind Is to Keep It near the Kitchen, yet Protected from the Kitchen Heat, Which would Naturally Increase the Consumption of Ice

of operation is not increased, and that the worry and thought necessary with the ordinary refrigerator is reduced greatly.

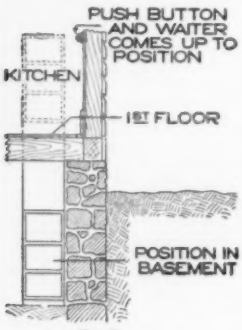


FIG. 2

These built-in refrigerators may be placed in any number of positions, as shown in Fig. 1, or as the owner may desire. The one main object when locating a position for a refrigerator of any kind is to keep it near the kitchen, yet protect it from the kitchen heat, which would naturally increase the consumption of ice.

Should the owner object to the expense of the built-in refrigerator, he may purchase one with an "outside icing door" and have a door cut through the outside wall to correspond with the door of the refrigerator.

The average person connects the dumb-waiter with apartment houses, saloons, restaurants, clubs, and the like, but gives it no consideration for his own private use. There are now on the market several dumb-waiters, operating as shown in Fig. 2. Many persons who use this type of dumb-waiter do not use ice, but put the perishable food on the waiter and push it down into the cool cellar, or, if there is no cellar, into a hole made for it. As there is no shaft necessary for the operation of the waiter it is entirely out of sight until wanted. The operation consists of pushing the button to bring the waiter up through the floor. Some of these waiters are equipped with small refrigerators. Either kind is very satisfactory in operation.

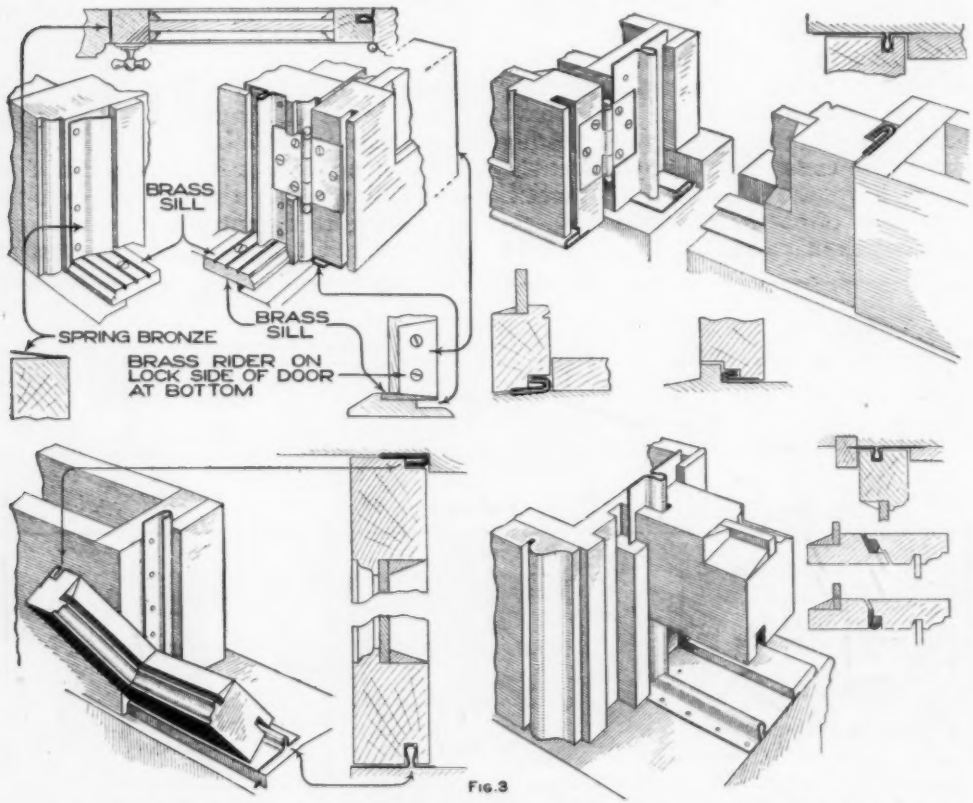


FIG. 3

Metal Weather Strips are Put in Place and Forgotten, Are Practically Invisible, and Need No Painting or Repairing, as They are Made of Bronze, Which Never Corrodes

Weather Strips

A few years ago metal weather strips were an experiment, but this experiment became so successful that today very few houses are erected in which the owner does not have some kind installed. The old-style storm windows and doors were either sticking or else letting in a draft. Ventilation during the winter was forgotten entirely, as the little hole allowed in most sash for ventilating purposes is of no use except to fool people who think that because air is cold it must be fresh. Exhaustive tests have proven that the average double, hung window leaks as much air as would a hole in the glass the size of a quarter. The worst place for air to pass a double, hung window is at the meeting rail where the sash come together when the window is closed. A good test for this is to hold a lighted match near the rail and see if the incoming air will blow it out. Because of this leakage of air it is almost compulsory to equip the windows with the old-fashioned heavy, leakable, nonventilating, bothersome storm sash, or else with the modern light, indestructible, and perfectly ventilating weather strips.

Storm sash must be put up in the fall and taken down in the spring, and they take up considerable storage space in the attic or basement, and are apt to be broken in making the change. They must be painted occasionally and renewed entirely every few years. Storm sash protect against snow, and to some extent against water and wind. They do not protect against dust, and being improperly ventilated, they are insanitary.

Metal weather strips are put in place and forgotten, are practically invisible and need no painting or repairs, as they are made of zinc and bronze, which never corrode. They protect the house from snow, rain, wind, dust, and everything of a like nature. The window is just as adaptable to ventilation as it is without the strips. In addition to all this, there remains the fact that practically all casement windows need protection throughout the year from rain and wind, and this protection can be had by weather strips.

The method of applying these strips

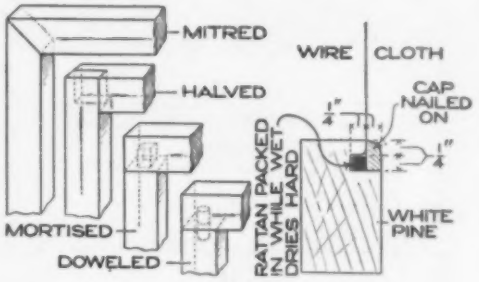


Fig. 4

There Are Two Kinds of Frames for Screens, Wood and Metal, the Wood Preferred

is shown in Fig. 3. Most of the manufacturers will sell to any person and give instructions for applying them, in which case it is cheaper than storm sash. If applied by an experienced worker, the cost will be about the same as for the storm sash, but the first cost of the strips is also the last cost, which is more than can be said of the old-fashioned storm sash.

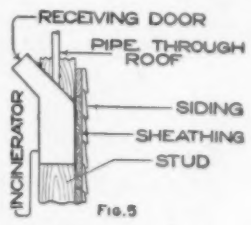


Fig. 5

Window Screens

There are two kinds of frames for screens, wood and metal, with preference for the wood. Several corners for wood frames are shown in Fig. 4. When a wood frame is put together with dowels it will last for many years, and the screen may be easily rewired if necessary. Metal frames cause the wire

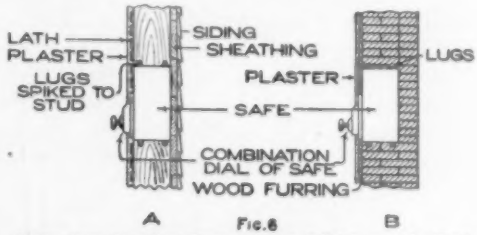


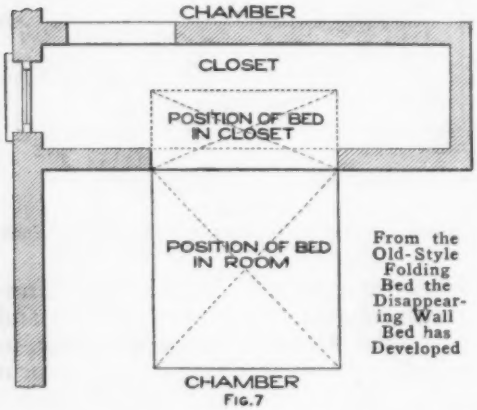
Fig. 6

Safes Are Another Convenience Which can be Had in Small Sizes and Built into a Wall

cloth to rust out sooner, and in most cases the frame must be sent back to

the factory for renewal, which is very expensive.

Next to the frame for the screen comes the wire cloth, or screen covering, which is of three kinds, black, galvanized, and bronze wire. Of course,


CHAMBER
CLOSET
POSITION OF BED IN CLOSET
POSITION OF BED IN ROOM
From the Old-Style Folding Bed the Disappearing Wall Bed has Developed
CHAMBER
FIG. 7

there are many special kinds of galvanized wire which are sold under copyrighted names, but the regular 12 and 14-mesh galvanized-wire cloth is very satisfactory. Black-wire cloth, while cheapest in initial cost, is expensive in the end, because it lasts only a year or two, unless it is painted once or twice a season, in which case it may last a year or two longer. Galvanized screens will last for years without any paint protection, and if the screen is to be submitted to continual use, always select the galvanized or bronze wire. Bronze wire will stand the elements without harm and will never corrode, but it is rather expensive. Very often the galvanized-wire cloth is used and painted black to cover up the silverlike finish of the galvanizing. Real fine-mesh bronze wire is sometimes used on sleeping porches which have no windows to protect the interior from rain. While the rain and snow will not work through this cloth, the closeness of the mesh will prevent a great quantity of air from passing through.

Electric-Plug Outlets

If the owner desires, and can afford, to purchase electrical-heating apparatus, he may obtain electric toasters, chafing dishes, water heaters, bed warmers, curling irons, and, in fact, almost anything in the heat line. All the standard apparatus is satisfactory and reasonable in price. It is necessary for the owner to see that the plug outlets for the various pieces are in the proper locations. For instance, there should be one outlet in the kitchen wall for the electric flatiron, and one for the electric stove and oven; two outlets, or more, in the dining room for the toaster and chafing dish. One outlet should be provided on each side of a lady's dressing table, one for the curling iron and one for the vibrator. The den, or library, should have an outlet for the cigar lighter; all living rooms should be provided with outlets in the base for table lights, and one should be installed in the bathroom for a water heater. If the owner is of a mechanical turn, he will do well to have two or three placed in that part of the house which he intends to use for his shop, one for an electric soldering copper, one for a small heater for making glue, and one for the vulcanizer, if he has an automobile.

Garbage Disposal

There are garbage incinerators, or burners, which are desirable even where the garbage is collected two or three times a week. Refuse breeds flies if it is left for a time, and by burning the garbage after each meal it is destroyed without odor. Most of these burners operate by gas and are designed like a stove with a pipe connection from the top into the chimney from the kitchen, or into a pipe which is run up just inside of the outside wall. Some of the burners are set into the wall with only the receiving door visible. No matter what kind of burner or incinerator is purchased, it will be worth its cost many times over in the feeling of cleanliness and comfort which it affords. The outline of one of these incinerators, set in a wall, is shown in Fig. 5.

Wall Safes

Another important addition to any house is a small wall safe that can be

purchased and built into either a frame or brick wall. When built into a frame wall, it is difficult to remove, and when built in a brick wall, the wall must be torn out before the safe can be taken out. While these safes are small, they will hold quite a sum of money, insurance and other valuable papers, and jewelry; they have a regular combination lock and can be easily concealed behind a picture or drapery. A wall safe in frame construction is shown in Fig. 6, at A, and one placed in a brick or stone wall, at B.

Disappearing Wall Beds

The old-style wall bed has been condemned as insanitary. The folding bed was a necessary device, and from it has been derived the disappearing wall bed. These beds, as shown in Fig. 7, do not exactly fold up, but fold back or disappear into a space in the wall which is equipped with plenty of light and ventilation so that the bedding is thoroughly aired while out of the room. The plans in Fig. 8 illustrate several examples of how wall beds could be installed in living rooms in smaller houses to be used in an emergency.

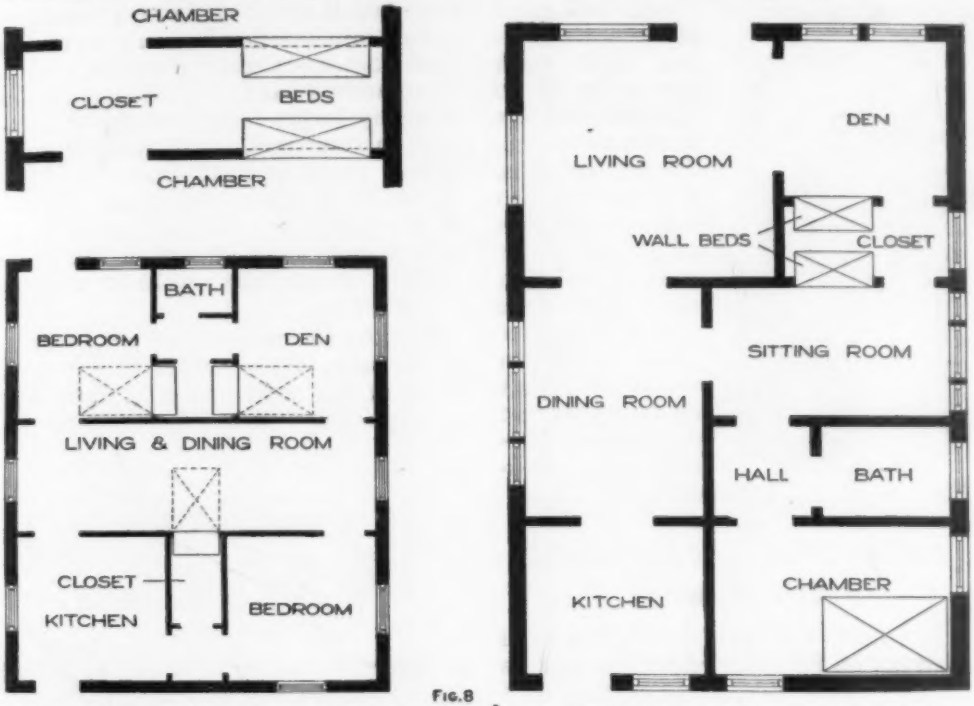


FIG. 8

Instances Where Wall Beds could be Used to Advantage in Smaller Houses by Installing Them in the Living Rooms, to be Used in an Emergency

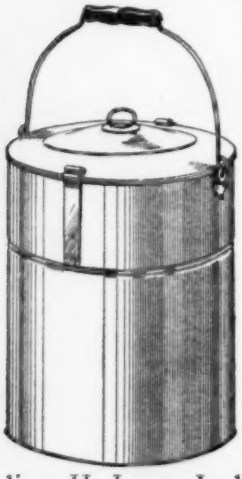
Then there is the disappearing stairway, for use in reaching the attic, when there is no room for regular stairs. These stairs are lifted up and pushed upward. The counter weight on the handrail gets into action and closes up the ceiling opening with a solid wood panel after pulling the stairs completely out of sight. When it is to be used, a rope is pulled, out falls the panel, and the stairs slide down, all provided with a handrail. These are real stairways, and not ladders.

Retaining Surface for Plastic Asbestos

Covering a boiler, or any other surface, with plastic asbestos is greatly facilitated if a casing of wire screen is placed on the object. The wire acts as a retaining surface and insures a coating of uniform thickness.

Catches to Hold Food Deck in a Dinner Pail

Occasionally my dinner pail would upset, and the food in the dinner deck push the cover off so that the contents would be spilled. To prevent this, I fastened two clips to the side of the dinner deck so that their upper ends would pass over the cover when the deck was pushed into the pail part.—Contributed by William H. Jones, Ladysmith, B. C.



Cutting Lubricant for Unpickled Steel Castings

For finishing green, unpickled steel castings so as to leave the surface as smooth as possible, use a cutting fluid mixed as follows: To three parts of turpentine add one part lard. Apply this mixture with a brush.

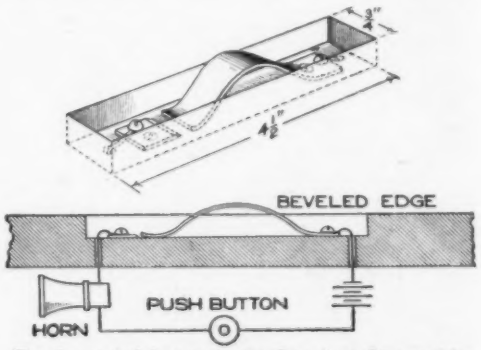
To Set the Jaw of a Monkey Wrench

In using a monkey wrench on nuts or bolts where there are several of one size, it is quite a help to keep the jaw set, since the adjusting sleeve will turn and move the jaw one way or the other. To remedy this, I drilled and tapped a hole for a ¼-in. thumbscrew, as shown in the sketch. A slight turn, and the screw tightens on the sleeve and will keep it from turning.—Contributed by Chas. G. England, Washington, Pa.

Disconnector for Electric Horns on Automobiles

To prevent the small boy from sounding the electric horn, some owners of automobiles loosen one of the terminals when getting out at a stop. This method has the disadvantage that one may forget to replace the connection on returning, which makes an accident possible next time the horn should be sounded. A simple way out of the difficulty is to fit on a small spring switch, as shown in the illustration, under the cushion on the driver's seat.

Remove the cushion and cut a recess, ¼ in. deep, in the center of the front edge of the seat frame. Make the spring from a piece of strong spring



The Concealed Switch in the Circuit is Operated by the Cushion on the Driver's Seat

brass, ⅝ in. wide and curved, so that when it is in place the top of the bend will project ¼ in. above the surface. Fix a small terminal plate just in front of the free end of the spring so that the pressure on top of it will cause the spring to straighten out and rest on the plate. The edge of the plate should be beveled to permit the end of the spring to slide over it freely. Make the connections as shown, passing the wires through holes in the seat. The spring should be strong enough to support the weight of the cushion easily without bending. As soon as the driver takes his seat, the horn is ready for sounding in the ordinary way.—Contributed by Morris G. Miller, New Rochelle, N. Y.

Measuring Wire without a Gauge

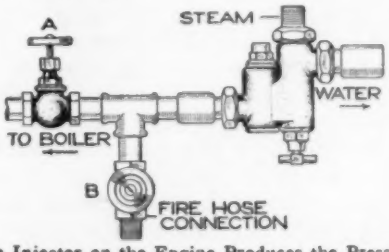
When a gauge is not at hand to determine the size of a wire, closely wind a sufficient length on a smooth nail to cover exactly ½ in. and then count the number of turns. Double this number and refer to the following table, which will immediately give the correct gauge.

Gauge	Turns per inch	Gauge	Turns per inch
10	10	24	50
11	11	25	56
12	12	26	63
13	14	27	70
14	16	28	79
15	18	29	89
16	20	30	100
17	22	31	112
18	25	32	126
19	28	33	141
20	31	34	159
21	35	35	178
22	39	36	200
23	44		

With smaller sizes it is only necessary to wrap about ¼ in. on the rod, or nail, to get the number of turns per inch.—Contributed by John D. Adams, Phoenix, Ariz.

Fire-Hose Attachment to a Switch Engine

An effective pressure, sufficient to throw a stream of water for fighting fires, was obtained by the use of an attachment on the injector of a switch engine used about the yards of a railroad. When used for a fire, the valve A on the boiler line is closed, and the valve B to the fire hose, which is normally kept closed, is opened. The hose is kept attached and the end



The Injector on the Engine Produces the Pressure for the Fire Hose

coiled on a reel at the side of the engine. As the tender carries 7,000 gal. of water, quite a supply is available for fire purposes before it runs too low for steaming.

A Lock for a Ladder

Being desirous of leaving a ladder standing against my barn for observation purposes and not wanting the boys

A Door Covering the Rungs of a Ladder is Locked in Place to Prevent Boys from Climbing

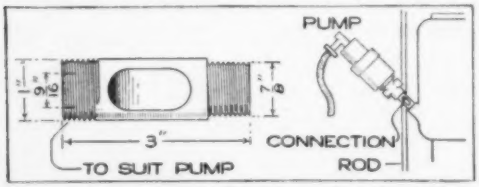
to be climbing it, I rigged up the ladder with a door which may be locked, as shown. The back of the ladder is also solidly boarded in.—Contributed by R. F. Pohle, Lynn, Mass.

An Extension for a Tire Pump

On automobiles having the valve-in-the-head motors, many owners find it next to impossible to use a spark-plug impulse tire pump, a type that has done much to relieve the work of inflating the tires. On these motors the valve rods interfere with the application of the pump when a spark plug is removed.

To overcome this difficulty a special connection may be made. It will not cost much and will be well worth the making. One end is threaded to fit

the spark-plug threads in the cylinder, and the other to turn into the pump. Two plates should be put on the sides



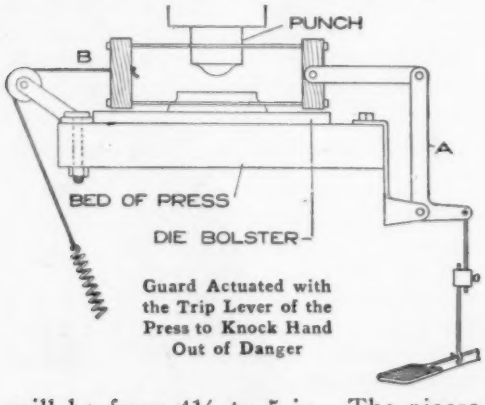
Connection to Attacn a Tire Pump in a Spark-Plug Hole Where Valve Rods Interfere

so that a wrench can be used to tighten it. The illustration shows such a connection and how it is used.

Guard for a Punch Press

Where it is necessary to feed pieces by hand into a punch press for forming them, the possibility of injuring the operator's hands is very great, and to eliminate this danger there must be some kind of movable guard that will not be in the way of the feeding of the press, yet obstruct the way just before, and at the time of, making the stroke. The illustration shows a form of guard I have employed with success.

The lever A should be about 12 to 1, which will move the wood pieces about 5 in. across the die, this being sufficient for small dies. The vertical length of the pieces is limited to the height of the ram when it is down. The space

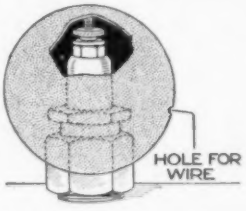


Guard Actuated with the Trip Lever of the Press to Knock Hand Out of Danger

will be from 4½ to 5 in. The pieces are held together with ⅛-in. wires. The guard is returned to its normal position with a small, round belt, or strong cord, attached and run over a pulley to a long weak spring. The adjusting rod is hooked to the pedal near the footplate so that it will move farther than the part where the clutch rod is connected. In action, the wood piece B will be entirely across the die before the clutch is released, and will knock the hand away as it passes.—Contributed by S. C. Bunker, Brooklyn, N. Y.

Coverings for Marine-Motor Spark Plugs

Having no way to cover my boat engine I devised a way to protect the spark plugs in the following manner:



I purchased several hollow rubber balls, about 2 in. in diameter, and in each ball I cut a hole slightly larger than the base of the spark plug. About 1½ in. above this hole a smaller hole was cut for the wire connection to the plug. A slot was cut between the holes, and the ball slipped over the spark plug. The slit remains tightly closed when the ball is on the plug, thus forming a serviceable covering.—Contributed by L. H. Ritchie, Georgeville, Can.

The Use of Skid Chains

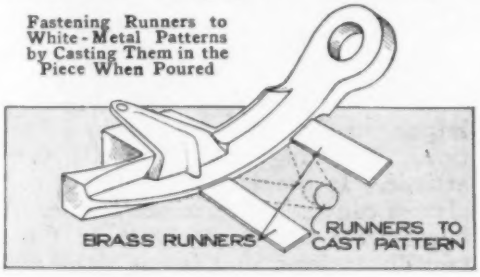
Never drive an automobile with a skid chain on one of the rear wheels only. When skid chains are necessary, it is far better to use two chains—one on each rear tire. When but one chain is used and the brake is applied, the wheel to which the chain is attached will stop readily, but the wheel without a chain will spin around many times, which tends to grind off the tread and causes it to wear much faster than if two chains were used. On an actual try-out it was found, at the end of a 1,500-mile run, that the tire having the chain was not at all damaged and the tire without a chain had the tread almost worn off.

To Fasten Runners in White-Metal Patterns

In making white-metal patterns, I have always found it difficult to fasten the runners securely to the pattern where they are to be used in bench molding. They can be firmly fastened, however, by casting them in the pattern when poured. The brass runners are first tinned, then a mold is made from the master pattern, and the brass runners are laid in their proper places. Then the runners are cut to cast the pattern so that the hot metal will flow around the brass pieces until the mold is full, which fastens them to the pattern. Two or more patterns are attached to the gate in the usual way.

I have two white-metal patterns that have been in use for some time, and they are still firmly attached to the gate, and are as satisfactory as brass patterns, while the cost is very much less. The patterns weigh 3½ lb.

Fastening Runners to White-Metal Patterns by Casting Them in the Piece When Poured



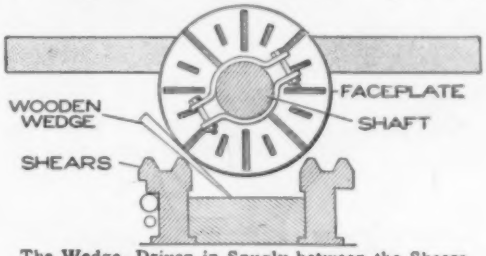
each, and where the runners are attached the metal is only 3/16 in. thick, which would make it very difficult to fasten them in the ordinary way.—Contributed by W. E. Smisor, Waterloo, Iowa.

To Stop Planer Bed at Same Point Each Time

In planing out a keyway in a shaft, or up against a shoulder of any kind, it often happens that the planer will not stop at the same place every time, but goes farther, usually breaking the tool. Tighten up the reverse belt, and it will stop at the same place every stroke.—Contributed by W. E. Butler, Wausaukee, Wis.

To Stop the Chattering of a Large Lathe

A large lathe in one of our shops always gave trouble when it was used for finishing large shafts and bushings. No matter how tightly the head bearings and the tailstock might be,

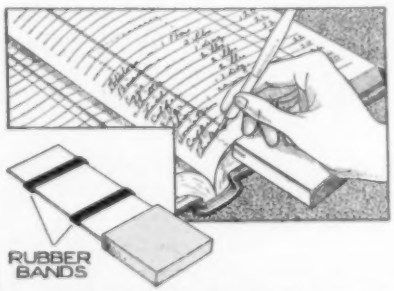


The Wedge, Driven in Snugly between the Shears and Faceplate Edge, Stops the Chatter

it would chatter. One day a new man was set to work on the lathe to turn up several large shafts. When he came to the finishing part, he stopped the chatter by inserting a long, thin taper wedge between the shears and the faceplate edge. The wedge was set snugly with a hammer.—Contributed by Joe V. Romig, Allentown, Pennsylvania.

To Prevent Bookkeeper's Hand Rest from Slipping

The ordinary hand rest used by bookkeepers to slip in between the leaves of a large ledger gives considerable trouble by slipping out of place, if the book leaves are the least bit smooth. This can be easily remedied if two wide and thin rubber bands are

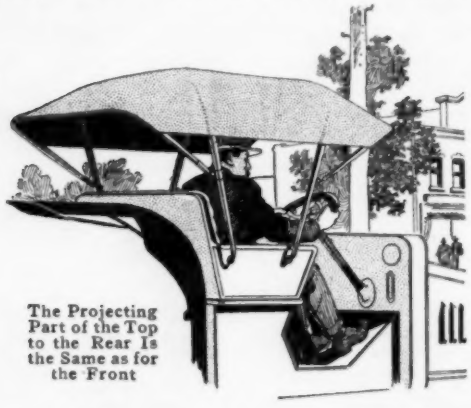


Rubber Bands on the Thin Portion of a Bookkeeper's Hand Rest to Prevent Its Slipping

placed over the thin portion that is inserted between the pages.

An Efficient Automobile Top

The style of automobile top illustrated is specially adapted for tank trucks where its rear projection causes

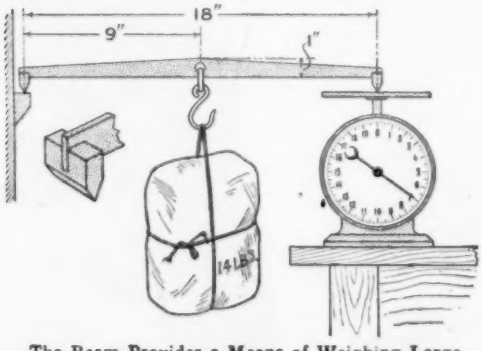


The Projecting Part of the Top to the Rear Is the Same as for the Front

no interference with the load. It will be noticed that the top differs from the ordinary single-seat top in that it projects to the rear as well as to the front, keeping the driver's back shaded without the use of a curtain, which hinders the view when glancing backward.

Doubling Capacity of Spring Scales

The ordinary variety of spring scales can be made to weigh double the amount given on the dial by the simple beam arrangement shown in the illustration. Suitable dimensions are given, although these may be varied to suit

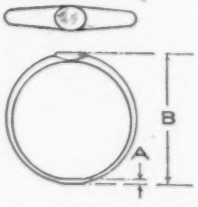


The Beam Provides a Means of Weighing Large Objects on a Small Spring Scale

the requirements. The only thing to remember is that the hook must be located exactly halfway along the beam measuring between the two knife-edged pieces of wood fixed at the ends. The beam should be made of light but strong wood, ¼ in. thick, and the end pieces 1 in. long. In use, the beam should be approximately level, with one end placed on the center of the scale platform and the other end set on a support, which could be a piece of wood nailed to the wall, or any other support. The object hung on the hook will show only half its weight on the dial. Thus if the pointer indicates 15 lb. the object weighs 30 pounds.

A Convenient Test Gauge

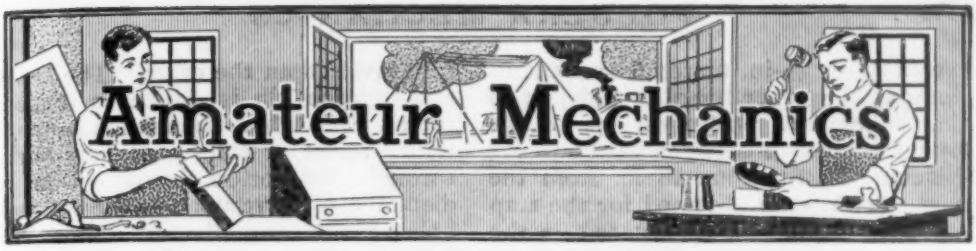
A very convenient and easily made reference gauge for toolmakers and machinists is in the form of a finger ring. It is made of steel with three flat surfaces ground as shown in the illustration. The smaller dimension, A, should be about 1/32 in., and the larger one, B, in some common fraction. The ring may be made very artistic. It provides an accurate and always convenient reference gauge. A micrometer that is accurate at these two dimensions, that is one small and one large dimension, is usually safe for general work.



A Double-Capacity Clothesline

A clothesline of double capacity can be made of any-width net, or mesh wire, stretched between two supports to keep the wire taut. Clothes may be hung on both sides of the wire. Sheets can be thrown over the whole wire and easily kept off the ground.—Contributed by Autrey Monsey, Trickham, Texas.

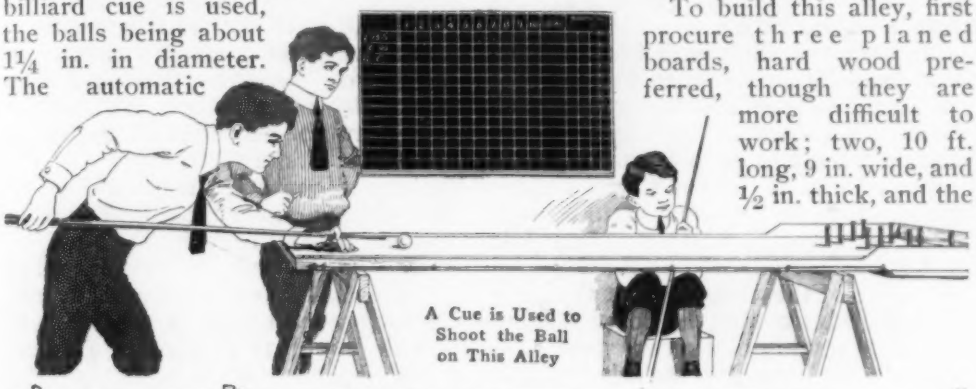
¶Do not use a reamer in a pipe, as the flux, used in welding or brazing, is as hard as glass and will ruin the reamer.



A Parlor Cue Alley

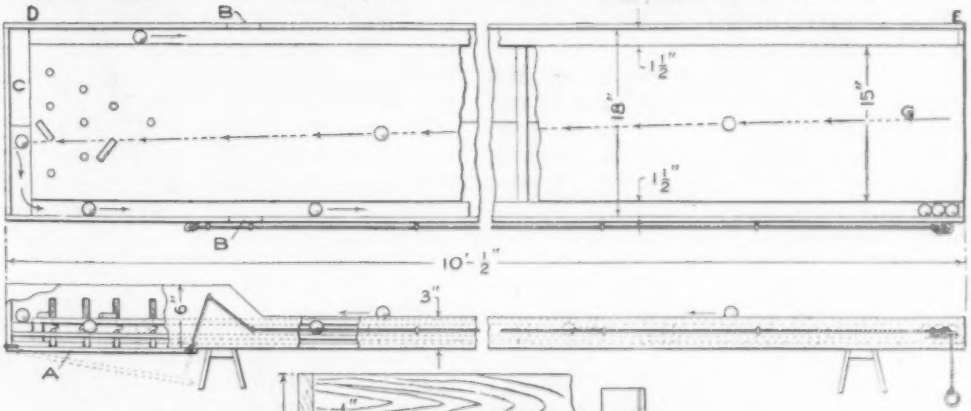
By C. QUINCY IVES

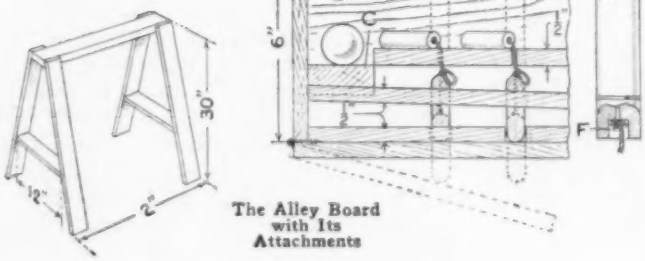
PARLOR cue alley is really a game of bowling except that it is played on a small raised board, and, instead of throwing the balls by hand, an ordinary billiard cue is used, the balls being about 1¼ in. in diameter. The automatic feature of this new game saves the time usually required to set up the pins, and assures that they will be set absolutely true each time.



A Cue is Used to Shoot the Ball on This Alley

To build this alley, first procure three planed boards, hard wood preferred, though they are more difficult to work; two, 10 ft. long, 9 in. wide, and ½ in. thick, and the other, 10 ft. long, 15 in. wide, and ½ in. thick. Place the first two boards side by side and fasten them with cleats, the first cleat being placed 18 in. from the end to be used for the pins. The cleats should





The Alley Board with Its Attachments

be of ¾ or ⅞-in. material and cut as long as the upper board is wide, or 15 in. These are placed on top of the lower boards, or between the two. By placing the first one 18 in. from the end, clearance is obtained for the trap A. The other board is placed on the cleats and fastened, after it has been centrally located, with screws from the under side. The screws must not come through or the surface of the upper board be marred in any way so that the balls cannot roll freely. The difference in width of the lower board and the upper one provides 1½-in. clearance on each side as grooves for the return of the balls.

Inclose the alley with boards, 3 in. wide and ½ in. thick, to the point B, and from there around the pin end with boards, 6 in. wide. The upper board should be cut to such a length that a space of 2 in. at the end C will be provided. Into this space is fitted a block of wood, about ⅞ in. thick, having its upper surface slightly pitched toward the sides of the alley to start the balls back to the front of the board. From the ends of this block two strips, 1½ in. wide, are fitted into the side grooves, from D to E, on an incline, to return the ball after each shot.

The location of each pin is marked on the end of the upper board, and small holes are drilled just large enough to admit pieces of stout cord, like a fishline, to pass through freely. The pins are made of hard wood, carefully balanced, so that one end will not be heavier than the other. The lower end of each pin is drilled to make a recess, F, in which the cord is fastened with a screw or nail. Holes are bored through the bottom board, ⅜ in. in diameter, to correspond to the 10 small holes made through the upper one. Lead weights of about 2 oz. are fitted in the holes and attached to the strings from the pins. The ends of the weights should extend about ½ in. from the under side of the alley.

Attach a board, 18 in. square, with hinges to the end of the alley so that it will hang under the weights. A stout cord is run along the under side of the alley to the front end through screw eyes, and attached to the swinging board. By letting the board swing down the weights are released and they draw the pins into a standing position, accurately set for the next break. When set, the line is drawn, and the swinging board pushes the weights up and releases the pins.

The balls used are made of hard wood, and, if it is not desirable to make them, they can be purchased from a toy store. They are 1¼ in. in diameter. Each player has three shots. The ball is placed on the spot G and shot with a billiard cue, the object being to knock down as many pins as possible; the score is kept as in bowling.

Horses can be made of metal and wood, as shown, for holding the alley at the proper height. The alley can be used on a large table, but horses are more convenient.

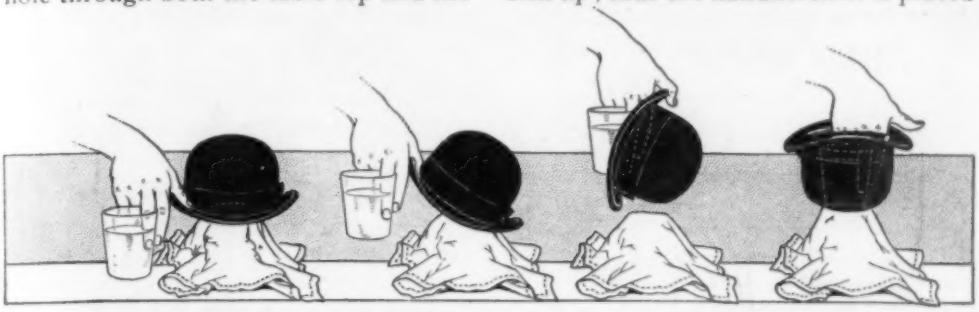
The Glass-and-Hat Trick

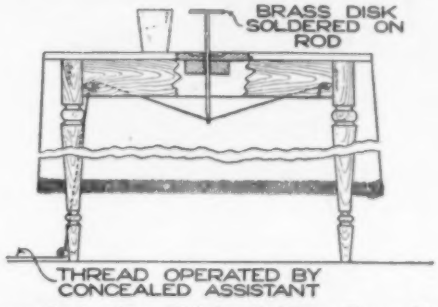
The effect of this trick is as follows: The performer first exhibits a small table, about 2 ft. square, the top of which is covered with black velvet. He requests the loan of a Derby hat and a handkerchief, then takes an ordinary glass, filled with water, and places it on the table top, covers it with the handkerchief, and sets the hat on top of the glass. He then withdraws a short distance, and at a command, the glass appears to pass slowly through both handkerchief and hat until the hat rests on the table top. The hat is then taken up and is handed to the owner, who finds the glass of water in the hat.

While this is seemingly impossible, the effect can be easily accomplished and the necessary apparatus can be made up cheaply if a table of suitable size can be had, although a kitchen table may be used if so desired, but a table about 2 ft. square is preferred, because it can be easily carried. The table is prepared as follows: Procure a block of wood, about 2 in. square and 1½ in.

thick, and glue it to the under side of the table in the center. Bore a ¼-in. hole through both the table top and the block of wood. The top of the table must be covered with some black cloth, such as velvet. Using the hole bored as a center, cut out a piece of the table top to correspond with the diameter of the glass to be used, and about ⅛ in. deep. Fit into this depression a piece of round sheet brass. Procure a ¼-in. rod, about 6 in. long, and fasten the brass disk to one end of it so that the disk will fit into the round depression when the rod is run through the hole in the table top and block. The other, or lower, end of the rod is filed flat, and a small hole is drilled through it, the edges being smoothed to receive a thread. The top of the brass disk is covered with the same material as is used for covering the table top. This will make it appear to be one piece covering the table top. Fasten a strong black thread to one corner of the table top on the under side, and run it through the hole drilled through the end of the rod, then over a small window-curtain roller fastened into the opposite corner of the table top, where the thread is run down a table leg and through another pulley out under a rug or the floor to an assistant where the thread will not be seen. The metal disk can then be controlled without any apparent power. If the rod extends under the table too far, drape some velvet or fancy cloth around the table edge to cover it.

To begin the trick, the performer exhibits the glass of water, then sets it on the table just back of the disk, and in placing the borrowed handkerchief it is put on the disk rather than the glass. As the handkerchief is held in front of the glass the assistant pulls the disk up; thus the handkerchief is placed



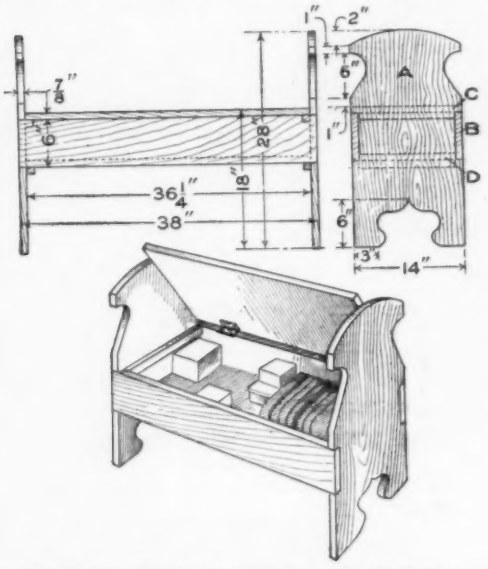


Apparently the Glass Filled with Water Passes Up through the Crown of the Hat and is Taken from It When the Trick is Completed

on the disk and the glass of water is left uncovered just behind it. The performer then starts to put the borrowed hat on the glass, crown up, and when, seeing his mistake, he apologizes, turns the hat over, and in doing so picks up the glass of water and places it in the hat. The hat is then set on the disk with the crown down. In turning the hat the glass is taken up with the first two fingers of the right hand. When the hat is raised, the glass is also raised with it, and while doing this the hat is slanted so as to hide the glass. In turning the hat over, the glass is brought into it. This is quite hard to explain, but a little practice will enable the performer to make no mistake. When the hat is placed on the disk the assistant slowly lets the disk down. It is very necessary to let the hat down slowly, as a sudden jerk is apt to tumble the hat over and spoil it as well as the trick. When the hat comes to rest on the table top, it is removed and handed to the owner with the glass of water in it.

Hall Seat with Storage Compartment

The illustration represents a simple design for an easily made and substantial hall seat, provided with a compartment for odds and ends. It is advisable to make it of wood to match its surroundings. The following material is necessary:



Details Showing the Construction of a Hall Seat to be Made in Mission Style

2 ends, ⅞ by 14 by 28 in.
2 rails, ⅞ by 6 by 38 in.
1 seat board, ⅞ by 14 by 36¼ in.
1 bottom board, ⅞ by 12¼ by 36¼ in.
2 seat cleats, ⅞ by ⅞ by 12¼ in.
2 bottom cleats, ⅞ by ⅞ by 11½ in.

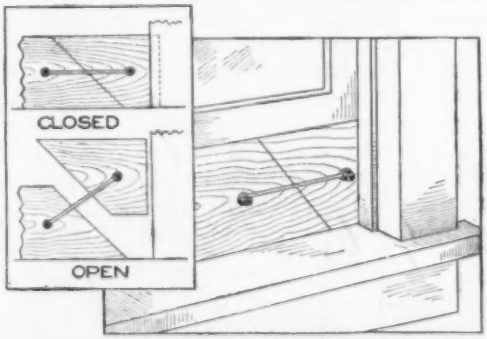
The two ends, A, are marked to the same outline and cut with a coping or scroll saw. If a fine-toothed saw is used, the edges of the boards can be easily smoothed with sandpaper, otherwise a file is necessary to remove the coarse saw traces. The rails B are cut to size and squared up at the ends, after which they can be placed at the proper places on the ends A, which may then be marked for the notches to receive the rails. In fastening the rails to the end pieces, 2-in. round-head screws can be used. The seat C is attached to the back rail by 2-in. butt hinges. To prevent the seat from sagging in the middle, it is supported on each side by cleats screwed to the end pieces A. If the seat is liable to warp it can be held straight by two cleats screwed underneath. The bottom board D may be held in place by means of screws through the rails, or by resting on cleats screwed to the end pieces. The seat, when assembled and thoroughly sandpapered, can be finished to suit.

Putting In Screw Hooks Neatly

To prevent a wire hook, when the last few turns are given, from marring or scratching the surface, special care must be taken. A splendid way to do the work neatly is to first lay a piece of stiff paper on the surface where the hook is to be attached and hold it in place while starting the screw hook. Turn the hook in the usual way through the paper. When the hook is in place the paper can be removed by tearing it off.—Contributed by Emile Parent.

A Window Ventilator

The illustration shows a ventilator I constructed to allow air to pass through between the upper and lower window sash. It consists of a board 8 or 10 in. wide, and as long as the window sash is wide. A short distance from one end it is marked and cut on a slant. The small piece removed is hinged to the main part so that it can be raised in taking the board from the window. When the sash rests on the board it cannot be removed from the window. — Contributed by David Hannigan, Orange, Connecticut.



A Removable Window Board to Raise Lower Sash for Ventilation between the Sashes

PART I—Prominent Types of Modern Skis

THE requirements of the modern ski call for a hard, flexible, and tough material, and while hickory, white ash, white maple, birch, yellow pine, white pine, and spruce are all used, the experienced ski runner considers hickory and ash to combine in the fullest measure the qualities most desired. Of course, every wood has its limitations as well as merits. Hickory is elastic and fairly tough, but heavy. Ash resembles hickory so far as elasticity is concerned, and its weight is about the same, but the wood contains soft layers. Birch possesses the requisite lightness, but is far too brittle to prove serviceable, and pine is open to the same objection. Maple makes an excellent ski, which can be finished very smooth so as to slide more easily than the other woods, but it is much less flexible than either hickory or ash.

The Telemark-Model Ski

This form of ski, so called from the Telemarken province of Norway, where the art of ski running has reached a high order of skill, is probably the choice of the sportsmen wherever the exhilarating sport of ski running is practiced, and the larger portion of the members of the numerous skiing clubs use the Telemark-model ski. This type is practically identical with the most popular model so long used in Telemarken, and the rule for its selection is to choose a pair whose length reaches the middle joint of the fingers when the arm is stretched above the head. There are various makers of this type of ski, and while the modeling will be found to differ but little, there are numerous brands sold which are fashioned of cheap and flimsy material, and consequently unsatisfactory in every respect.

The Telemark model is shown in Fig. 1, and from this sketch it will be seen that the wood has two curves or bends, one running its entire length to form a graceful arch, and the second, at the toe. The first one is technically known as the "arch," and the other curve the "bend," while the front or toe end of the ski is called the "point," and the rear end the "heel." In almost all skis the under, or running, surface is provided with a hollow, known as the "groove," which runs from the heel to the bend. It will be noticed in the drawing that the sides also are gently curved, thus making the ski a trifle broader at the ends than in the center. This curve affords a somewhat greater bend at the heel, and while some experts approve, others disapprove of it, but most ski runners agree that the curve should not be pronounced, or it will prove a handicap and make it difficult for the runner to secure a firm grip at the edge when ascending steep slopes covered with hard snow.

The "arch" of the ski is necessary to avoid bending when the weight of the body is on the runner, and the total height of this important curve should not exceed ¾ in., for a too exaggerated arch will practically form a concave running surface and retard the speed,

since it will run on two edges, or points, instead of on the entire running surface. A slight arch may be reckoned necessary to offset the weight of the body, but the utility of the ski, in nearly every instance, will be less affected by too little arch than by too great a curve at this point.

A good ski is told at a glance by its bend, which must never be abruptly formed, nor carried too high. A maximum curve of 6 in. is all that is ever required, and to prevent breaking at this, the weakest, part of the ski, the bend must be gradual like the curve of a good bow, thus making it more flexible and elastic at this point. As a rule, the ski should be fashioned a trifle broader at the bend than at any other point, and the wood should be pared moderately thin, which will make it strong and resilient with plenty of spring, or "backbone."

The groove in the running surface is so formed as to make the ski steady and prevent "side slip" when running straightaway. In fact this groove may be compared to the keel of a boat, and as the latter may be made too deep, making it difficult to steer the craft and interfering with the turning, so will the badly formed groove interfere with the control of the ski. The Telemark round-faced groove is by far the best form, and for all-around use is commonly made $\frac{1}{12}$ or $\frac{1}{8}$ in. deep. Not all Telemark skis are thus fashioned, however, some being made without the groove, while others are provided with two, and I have seen one marked with three parallel hollows. The shallow groove is the most satisfactory for general use, and while a groove, $\frac{3}{8}$ or $\frac{1}{2}$ in. deep, is good enough for straightaway running, it makes turning more difficult.

To attach the ski binding, which secures the shoe to the runner, a hole in the form of a narrow slit is made just back of the center. This is the usual manner of attaching the foot binding, and while it cannot but weaken the ski to a certain extent, it is the best method for making a secure foot fastening, and weakens the wood to a much less extent than the use of bolts, or other metal fastening.

So far as finish is concerned, most Norwegian makers finish their skis with a coat of black paint, while other makers stain the wood, and some finish the wood in the natural color by varnishing. This applies to the upper surface only, the running surface being rubbed down with linseed oil and made smooth with wax.

The Swedish Ski

This type of ski is made quite long and comparatively narrow, with a deep groove, and is well adapted for running on the level or for gliding down slight slopes. This type of ski is commonly used in Lapland and to a less extent in the northern parts of Norway, but the great length and quick, short bend make this model less adapted for ordinary use, since the deep, rectangular groove slows down the speed, and the great length makes turning doubly difficult. For special conditions this type is probably useful, but it can scarcely be considered suited to the average use.

Lilienfeld Ski

This type of ski is favored by but comparatively few ski runners, and the modeling is inferior to the Telemark ski. The arch is excessive in height, the bend is abrupt and stiff, while the round point, fashioned to prevent sticking in loose brush, has apparently little value in actual use. The Lilienfeld ski is made without a groove, and since the whole model is shorter and broader than the usual type of ski, turning is more easily accomplished, but side slipping is, of course, considerably increased. Ease in turning is a desirable quality, to be sure, but steadiness and immunity from side slipping are far more valuable qualities in a ski designed for all-around use. In short, the Lilienfeld model possesses no decided advantages over the Telemark type, but has many points of inferiority. To one who has used both models there can be no question but that the Telemark model is preferable.

When purchasing skis the sportsman

will make no mistake in selecting the Telemark model, and for an active person the skis should be long enough to reach to the middle joint of the fingers, when the arms are stretched above the head, and the ski is stood upright on its heel. The length of a pair so selected will be from 7½ to 8 ft. For elderly and less active persons, for individuals of short stature, and for ladies, skis reaching to the wrist joint will be about right; the length ranging from 6½ to 7 ft. For youths and children shorter skis, from 5 to 6 ft. in length, according to the size and strength of the person, are of course required.

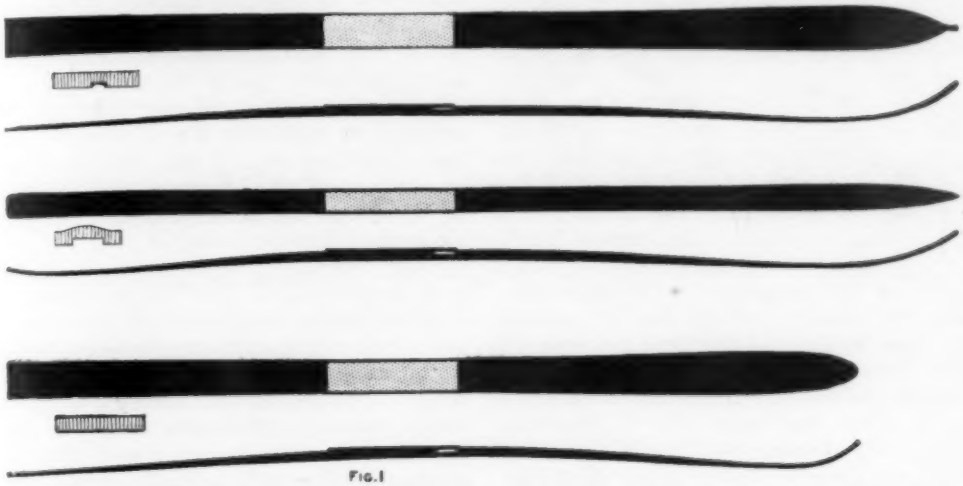


FIG. 1

The Telemark, Swedish, and Lilienfeld Models with Grooves and Grooveless Bottoms, the Telemark Being the Standard and Best All-Around Ski; the Swedish Is Long and Narrow with Upturned Heel, and the Lilienfeld Is Short with a Round Point, More Abrupt Bend, and without a Groove

For all-around use where a large amount of straight running is done, the running surface should be provided with a groove, but if there is not much straight work to be done, and ease in turning is regarded as an important factor, the running surface should be made smooth. This necessitates making the skis to order, for practically all ready-made skis of the Telemark model are fashioned with a shallow groove. However, a groove may be easily cut in at any time if wanted later on. While other types are at times preferred for special use in certain localities, the Telemark-model ski is the standard, being equally good for all kinds of work, straight running, uphill skiing, and for jumping.

The best materials are hickory, or white ash, with a straight, even grain running from end to end. Ash is well liked by many experts, but it would indeed be difficult to find a more satisfactory wood than our American hickory. In fact, many of the most prominent makers in Europe are now fashioning their skis from American timber. As a rule, the best well-seasoned ash, or hickory, is heavier in weight than an inferior grade, and this is why the expert skier considers weight as one of the reliable "earmarks" of first-class material. A good hickory, or ash, ski made by any reputable maker will give the fullest measure of satisfaction.

The finish of skis is purely a matter of personal taste, but practically all Norwegian skis are painted black on the upper side, while a few of the cheaper maple and pine implements are stained. The plain varnished finish protects the wood as well as paint, but allows the grain to show through, and is generally preferred by experts. The running surface must be as smooth as possible to obtain the best speed, and it must not be varnished, the wood being filled with several coats of linseed oil to which a little wax has been added.

Tar is used to some extent, but this preparation is mostly employed by Swedish makers.

The Requirements of Foot Binding

The manner in which the foot is secured to the ski is highly important, and while various kinds of "bindings" are in use, from the simple cane binding, which marked the first substantial improvement over the twisted birch withes originally used by the peasantry of Telemarken, the Huitfeldt bindings are for many reasons considered the best by experts. The ski runner must have a foot binding that is well secured under all ordinary conditions met with in ski running, and it must be quite rigid and without lateral play. It is desirable also that the foot be freed whenever a fall occurs, thus preventing possible sprains at the ankle and knee, as well as avoiding breakage of the straps. Again the heel of the skier should be free to move up and down for at least 3 in., but the binding should check the vertical movement at this height, thus easing the foot of undue strain when the ski is slid forward, in climbing or working on the level. These essential specifications are so well incorporated in the Huitfeldt model that the description and illustrations of this admirable attachment will suffice. As shown in Fig. 2, the boot is wedged into a firm position between the metal toe piece at the sides. To secure a rigid support, these toe pieces must be firmly wedged in position on the ski, and the skiing shoe should fit between them snugly and well. For this type of binding, a shoe having a stout sole is desirable so that it may keep rigid under the pressure of the body at various angles, and be heavy enough to stand the more or less constant chafing of the metal toe plates. One excellent feature of this binding is the arrangement of the toe and heel straps, which allow all necessary vertical movement of the foot, yet at the same time provide a fairly rigid, strong, and reasonably light foot attachment. When fitted with the Ellefsen tightening clamp, and it is a good plan to order the Huitfeldt model so equipped, the skis are easily put on and taken off. A large number of experts prefer this binding above all others, but the Huitfeldt type of binding may be made by the skier if desired. Any metalworker or blacksmith can supply the metal toe pieces, and the binding may be completed by adding suitable straps, or the foot may be secured at the heel by leather thongs.

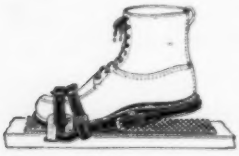


FIG. 2

The Skiing Stick

While there are occasions when the proficient ski runner can dispense with the stick, as in jumping and practicing many fancy turns and swings, a good stick must be reckoned a valuable implement for climbing and downhill running, and often a help on a level. The beginner should not depend too much upon the stick, however, but should acquire the knack of handling the skis without this aid early in his practice. In short, the novice should practice both with and without the stick, that he may learn all the little points of balancing the body unaided, but every skier ought to know how to use the stick, that he may rely upon its assistance whenever necessary.

The use of two sticks may be of help for mountain climbing, but the majority of ski runners consider one stout stick to be of more real service. For downhill running, the extra stick is of no value whatever, but rather a hindrance, the one stick being all that is required for braking. In choosing a stick, its height may be such that it will reach to the shoulders of the skier, although many prefer a shorter one. On the average, a stick 5 ft. long will be found about right for most persons, while a proportionately shorter stick will be required for boys and girls. Bamboo of good quality is generally preferred, since it is light, elastic, and very stiff and strong. Hardwood sticks are a trifle heavier, but if fashioned from straight-grain hickory, or ash, are as

satisfactory as the bamboo. In any case, the end of the stick should be provided with a metal ice peg, and a ferrule to strengthen the wood at this point. A few inches above the peg a ring, or disk, is fastened, and this "snow washer" serves to keep the stick from sinking too deeply into the snow. Wicker rings, secured with thongs or straps, are much used, as are also disks of metal and hard rubber. A decided improvement over these materials has been brought out in a cup-shaped snow washer made of aluminum, which is flexible and fastened to the stick with clamps so that it can be easily shifted or removed at will. This feature is a good one, since the washer is often useful for assisting braking in soft snow, but is likely to catch and throw the runner if used upon crusted snow, hence the detachable arrangement is of value in that it supplies an easy way to take off the washer whenever desired. The sticks are shown in Fig. 3.

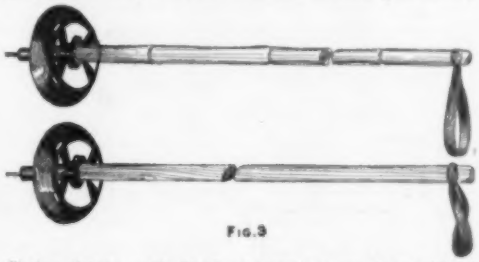


FIG. 3

Skiing Sticks with Staff of Bamboo or Hard Wood Having an Easily Removable Aluminum Washer

Necessities of the Skier's Outfit

For skiing an ordinary pair of heavy-soled lace shoes that fit well are suitable, but to keep the heel strap of a binding from slipping, the shoes should have broad, concave heels, or a small strap and buckle, firmly sewed in place at the extreme end of the heel, should be fitted to them. Personally, I prefer the heel strap to the special heel, but any cobbler can fit the shoes with either one. Specially designed skiing shoes, or boots, as shown in Fig. 4, are to be had at the sporting-goods dealers', and while good, are somewhat expensive, because most of them are imported. Of course, shoes for skiing must be amply large so that one or two pairs of woolen socks may be worn; two pairs of thin, woolen stockings being less bulky and very much warmer than one extremely heavy pair.

For clothing, the soft, smooth finish of the regulation mackinaw garments cannot be improved upon for outdoor winter wear, although any suitable material will serve as well. Smooth-finish material is the best in all cases, because cloth of rough texture will cause the snow to stick and make it uncomfortable. Regulation mackinaw trousers, split at the bottom and fastened with tapes to tie close to the ankle, are as good as any, over which cloth puttees, or leggings, may be worn to keep out the snow. For the coat, a mackinaw, made Norfolk-style, with belt and flap pockets secured with a button, have given me the most satisfaction. For ladies, close-fitting knickerbockers and leggings are generally preferred when a short skirt is worn.

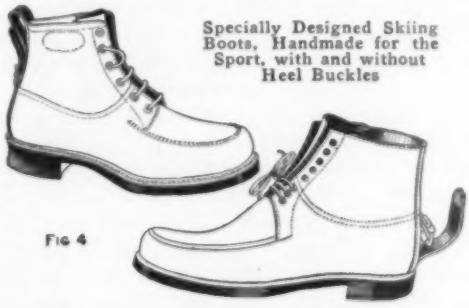


FIG. 4

Specially Designed Skiing Boots, Handmade for the Sport, with and without Heel Buckles

How to Make Skis

To anyone who can use a saw and plane, the making of a pair of nicely balanced and durable skis is a very easy job. Ski making is far easier than snowshoe construction, since each runner is made from a single piece of plank, and no intricate filling is required. In choosing the wood, either hickory or ash will give satisfaction, because both are heavy woods, as well as strong and flexible, and may be worked down much thinner than birch, fir, or other materials. If it is desired to fashion the skis from the rough material, procure two ash, or hickory, planks, about 9 ft. long and 2 in. thick. Should the maker wish

to hew his own material, select a sound and straight tree, about 10 in. in diameter, free from knots for at least 10 ft., and fell it during the winter. Place the log in the crotch of a stump and cut a groove along its length with the ax, taking pains that the groove is straight and about 1 in. in depth. Turn the log over and make a like groove in the opposite side. Rap the bottom of the grooves lightly with the ax, to start the split, and drive in small wood wedges, gradually working them along as the wood splits. At some points the wood will very likely split away from the groove, but by cutting these fibers, the split may be kept along the grooves. As the strongest and best grain of the wood will lie closest to the bark, only enough of the outside should be hewn away to make a flat surface, for this is to be the running surface of the ski. Skis may be made in any length and width, but for a man of good height, 7 to 8 ft. is the correct length. In Fig. 5 is given a complete layout pattern for an 8-ft. ski, and from the dimensions it is an easy matter to fashion skis longer or shorter by making use of these well-balanced proportions. While the plan of the ski may be drawn directly on the plank, it is an excellent idea to make a paper pattern, and laying this down on the board, trace around it to get the correct outline.

When purchasing the sawed material, the buyer should endeavor to obtain a plank which has been sawed out from the lower portion of the trunk of the tree, from the outside. The dealer will not be able to assist in choosing lumber for this particular purpose, hence the buyer should know something about the growth of good wood in the tree, and how to pick out this desirable material by noting the run of the grain. This is very well shown in Fig. 6. The letters A, B, and C show the run of the grain produced by the ring growth of the tree, and D, E, and F indicate the appearance of rings, in the run of the grain seen in the sawed plank. The best possible choice for wood is represented by A and D, because the layers of good and elastic wood run deep, and there is practically no soft layers of punky wood. That represented by B and E, and that of C and F, contain a larger percentage of soft layers, and while skis can be, and often are, fashioned from this kind of material, the wood is less strong and flexible than that of wood showing the grain as A and D, hence the latter should be chosen whenever it is possible to do so. While wood of fairly close grain does not necessarily indicate inferiority, if the material is hickory, yet if ash is selected, the purchaser should select an open, or widely spaced, grain in preference to a close and even-grained plank. And this is so because in all trees the grain represents the more quickly grown soft wood—formed in the period of greatest growth, which is in the spring and summer months—hence the more grain present in the plank and the closer it runs the more soft and punky wood is present, and the less durable the material will be for the purpose.

When drawing the dimensions on green, or partly seasoned, timber, a certain amount of shrinkage will occur, hence be sure to allow for this and make the width about ¼ in. greater. When working seasoned lumber, this need not be taken into consideration.

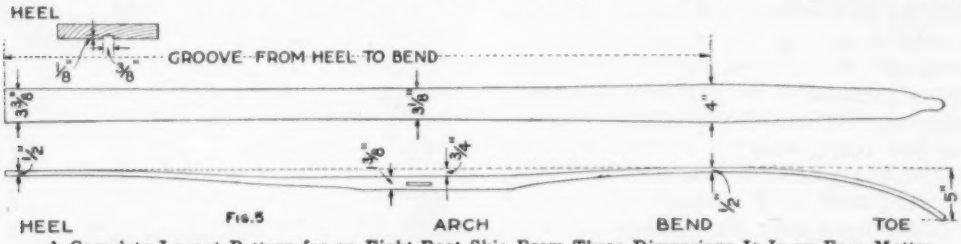


FIG. 5

A Complete Layout Pattern for an Eight-Foot Ski: From These Dimensions It Is an Easy Matter to Fashion Skis Longer or Shorter by Making Use of These Well-Balanced Proportions

After the outline of the ski has been sawed out, the bottom, or running surface, should be planed perfectly smooth, with the grain running straight and true from the point to the heel. The ski should be worked down to the desired dimensions before bending, and from the top, or upper, side only, never from the running surface. When the correct thickness has been reached, the bend at the point may be put in by soaking the wood well to make it pliable. This is most easily done by heating water in a wash boiler, and when the water boils, place the ski across the top and thoroughly soak the wood by mopping with the boiling water, using a cloth tied to a stick. That the bend may be gradual and not too abrupt, do not attempt to bend it to the desired arc at once, but gradually work the wood and resort to numerous hot-water treatments until a good 6-in. bend is obtained. The arch in the running surface is easily obtained, and if bent too much, is easily straightened out when cold. Of course, more bend must be given the skis than the actual curve will be when finished, since the wood will straighten out somewhat as it dries. Some kind of a form will come in handy, and this may be furnished by making a rough frame and placing a short length of log of the proper diameter at the bends, or the tips may be lashed, or cleated, to the floor of the workbench. A very easy method is shown in Fig. 7.

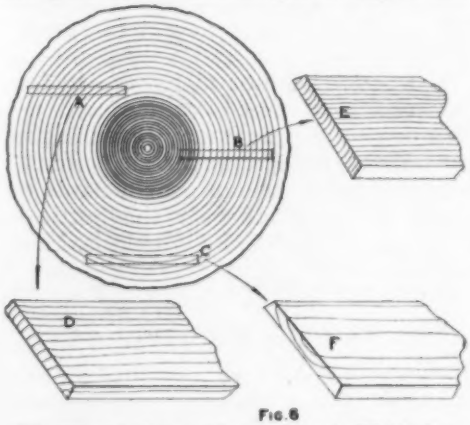


FIG. 6
The Wood is Selected by the Way in Which the Growth of the Grain Runs

After the bends are made, the hole for the foot binding should be put in, and if the wood has been left plenty long, the skis may be trimmed off at the heel so that they will balance nicely when lifted by the toe straps. This is the best way, for while a few skiers prefer to make the heel light and weight it with lead, there is no advantage in doing so.

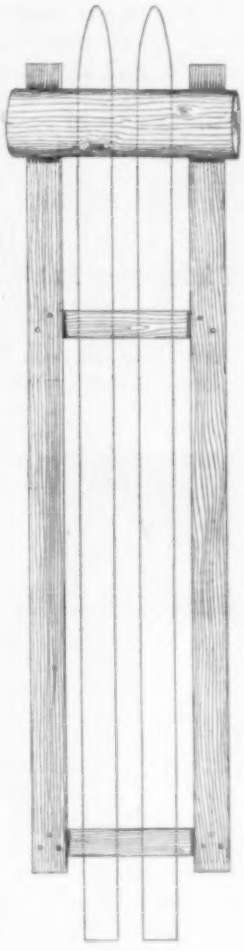


FIG. 7

The groove in the exact center of the running surface should now be cut in, which is made about $\frac{1}{8}$ in. deep, and $\frac{3}{8}$ to $\frac{1}{2}$ in. in width. A grooving plane is most convenient, but a small gouge, if carefully used, will do as well. The groove should run from the heel to the beginning of the bend.

To finish the ski, sandpaper top and bottom smooth, and rub down with linseed oil to which a little paraffin, or beeswax, has been added. The running surface of the ski should be finished with oil and waxed, and it is an advantage that the entire ski be finished in the same manner, as less snow will stick to the tops than if varnish is used. The experienced skier is more concerned about the running qualities of his skis than the finish, but the novice is more likely to be attracted by fancy implements. When varnished tops are wanted, a glossy and durable surface is obtained by

brushing on a couple of coats of good spar varnish.

A tube, or cake, of wax should be carried by every skier, for the running surface must have numerous coatings that the snow may not stick to the wood. Both paraffin and beeswax are suitable, and the skier may use one of the several good preparations put up in tubes and in cakes, or melt up his own, as preferred. A good cake, or hard, wax is made by melting up 10 oz. of beeswax with 5 oz. of rosin. When melted, stir in 1 oz. of turpentine and pour in small boxes to form cakes of convenient size.

The running surfaces are often waxed by rubbing the wax on and then going over the surfaces with a hot flatiron. This is a good method, providing only a sufficient quantity of wax has been applied. A too liberal application of wax cannot be called a disadvantage when running downhill, but it will make the runners so slippery that climbing uphill is difficult.

Filling Toy Rubber Balloons with Hydrogen

Any boy can easily convert a toy rubber balloon into a real flier by constructing the simple device shown in the illustration for filling it with hydrogen. Procure a clay pipe and break off the stem near the bowl. Bore a hole in a cork, or preferably a rubber stopper, selected to fit some bottle and insert the smaller end of the pipestem in the hole. As the stem tapers, if the hole has been made for the smaller end, a tight fit is assured by simply pressing the stem well into the cork. Tie the open end of the stem on the balloon tightly over the larger end of the pipestem, and have ready a thread to tie the stem of the balloon when it is filled.

Apparatus for Filling Toy Rubber Balloons with Hydrogen Gas to Make Them Fly to a Great Height

Procure from a local drug store 1 oz. of hydrochloric acid. Place some nails, or better still, a few strips of zinc, in the bottle and cover them with a little water, then pour a small quantity of the hydrochloric acid into the bottle and assemble as shown in the illustration. In a few minutes hydrogen gas will be given off, and if the joints are tight, the balloon will begin to fill. After it has expanded as much as it will stand without breaking, tie the end with the thread, and cut off any parts of the mouthpiece that may weigh it down. If sufficient gas has been passed into the balloon it will rise to the ceiling. Balloons filled in this manner have risen to a height of several hundred feet.

Caution: Do not allow the hydrochloric acid to come in contact with the skin or clothing, as it may cause frightful burns. Do not under any circumstance fill the balloon near a flame or allow fire to come near the bottle.—Contributed by Ralph C. Jenkins, Manchester, Vt.

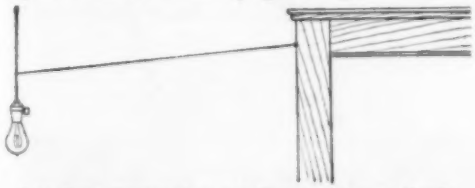
How to Polish Instrument Bases

There seems to be a feeling among mechanical and electrical experimenters that there is something mysterious about the process of wood finishing, and often one may see a really fine piece of apparatus spoiled by mounting it on a shellacked baseboard. I have found that it is a very simple matter

to produce almost a piano finish on all woods, even those as soft as poplar, in the following manner. Quick-drying wood dyes should be avoided. Simply rub down a piece of ordinary water-color cake into some plain water and apply freely with a rag, rubbing it in well. Any color may be obtained in this way, but if this is not convenient, use an oil stain made quite thin with turpentine. Next apply a thin coat of shellac, which should be sandpapered when it is dry. A coat of ordinary varnish is then applied, and when this is thoroughly dried, rub lightly with fine steel wool. One coat of varnish may be sufficient, although several coats will produce a richer finish. Rub the last coats down well with an oily rag dipped in some abrasive material, such as tooth powder or metal polish, and finish with a simple oil rub. A beautiful, soft, transparent effect may be obtained in this way on very ordinary woods. Any open-grained woods, such as oak, must be filled with a paste filler after staining.—Contributed by John D. Adams, Phoenix, Ariz.

Locating Droplight in the Dark

A simple device for locating a droplight can be had by putting a nail or



The Cord Fastened to the Door Casing is Easily Located and Followed to the Lamp

screw eye into the side of the door casing, high enough to clear persons passing under it, but within easy reach of an uplifted hand, and running a cord from it to the light. It is not difficult to locate the cord attached to the casing and to follow it to the light.—Contributed by H. S. Craig, Rushford, Minnesota.

¶If kerosene oil is used when drilling, reaming, or turning malleable iron, it will make the work much smoother.

How to Make an Experimental Lead Screw

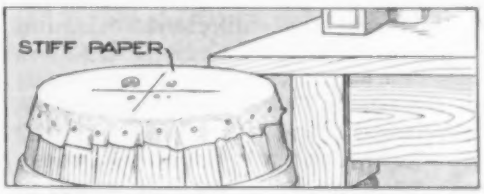
Often in experimental work a long, narrow, parallel screw is desired for regulating, or moving, some part of

A Copper Wire Wrapped around and Soldered to a Straight Rod for a Lead Screw

the apparatus in a straight line. A simple way of making such a screw is to tin thoroughly a small straight rod of the required length and diameter. After wiping off all the surplus solder while it is yet hot, wrap it with a sufficient length of bright copper wire and fasten the ends. This wire is then securely soldered in place by running the solder on while holding the screw over a blue gas flame. To make the solder run freely, brush frequently during the heating with a small mucilage brush dipped into the soldering acid. An even pitch can be secured by winding on two wires side by side at the same time, the second one being unwound before soldering.

Self-Setting Rat Trap

A suburbanite successfully trapped a bunch of rats by stretching a piece of stout elastic paper on the top of an open barrel. Spreading food on this paper he allowed it to remain until the suspicions of the rats were allayed, then he cut two right-angled slashes in the paper with a razor. Next morning



The Paper Stretched over the Barrel Top was Cut after Feeding the Rats on It for Some Time

he found seven of the pests in the barrel.

A Simple Motor Controller

The controller described is very similar in operation to the types of controllers used on electric automobiles, and its operation may be easily followed by reference to the diagrammatic representation of its circuits, and

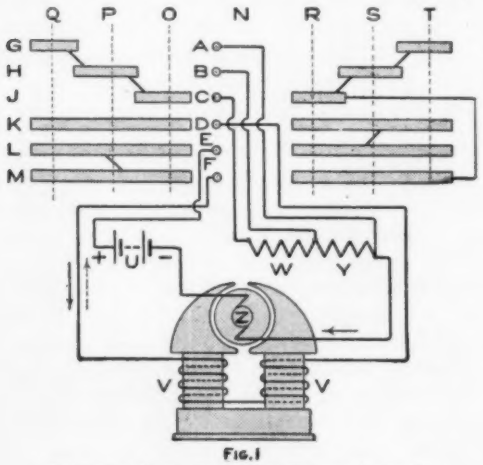


FIG. 1

Diagram of the Electrical Connections of a Controller to a Two-Pole Series Motor

those of a two-pole series motor to which it is connected, as shown in Fig. 1. The controller consists of six flat springs, represented as small circles and lettered A, B, C, D, E, and F, which make contact with pieces of narrow sheet brass mounted on a small wood cylinder, so arranged that it may be turned by means of a small handle located on top of the controller case in either direction from a point called neutral, which is marked N. When the cylinder of the controller is in the neutral position, all six contact springs are free from contact with any metal on the cylinder. The contacts around the cylinder in the six different horizontal positions are lettered G, H, J, K, L, and M. There are three different positions of the controller in either direction from the neutral point. Moving the cylinder in one direction will cause the armature of the motor to rotate in a certain direction at three different speeds, while moving the cylinder in a reverse direction will cause the armature to rotate in the opposite direction at three different speeds, depending upon the exact position of the cylinder. These positions are designated by the letters O, P, and Q, for one way, and R, S, and T, for the other.

Supposing the cylinder to be rotated to the position marked O, the circuit may be traced from the positive terminal of the battery U, as follows: To contact spring E, to strip of brass L, to strip of brass M, to contact spring F, through the field windings VV, to contact spring D, to strip of brass K, to strip of brass J, to contact spring C, through resistance W and Y, to armature Z, through armature to the negative terminal of the battery. Moving the cylinder to the position P merely cuts out the resistance W, and to the position Q, cuts out the remaining resistance Y. The direction of the current through the armature and series field, for all positions of the cylinder to the left, is indicated by the full-line arrows. Moving the controller to the positions marked R, S, and T, will result in the same changes in circuit connections, as in the previous case, except the direction of the current in the series field windings will be reversed.

The construction of the controller may be carried out as follows: Obtain a cylindrical piece of wood, 1¾ in. in diameter and 3⅛ in. long, preferably

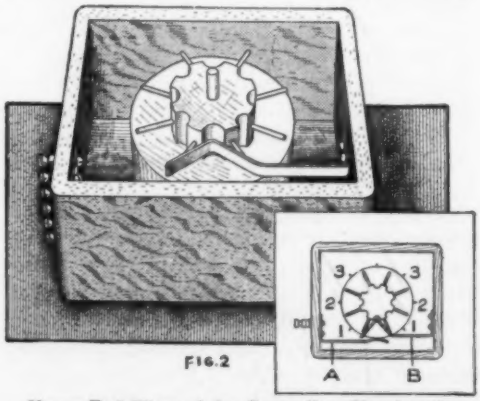


FIG. 2

Upper-End View of the Controller, Showing the Manner of Attaching the Springs

hard wood. Turn one end of this cylinder down to a diameter of ½ in., and drill a ¼-in. hole through its center from end to end. Divide the circum-

ference of the small-diameter portion into eight equal parts and drive a small nail into the cylinder at each division point, the nail being placed in the center of the surface lengthwise and perpendicular to the axis of the cylinder. Cut off all the nail heads so that the outer ends of the nails extend even with the surface of the outer, or large-size, cylinder. Divide the large part into eight equal parts so that the division points will be midway between the ends of the nails, and draw lines the full length of the cylinder on these points. Divide the cylinder lengthwise into seven equal parts and draw a line around it at each division point. Cut some ⅛-in. strips from thin sheet brass and mount them on the cylinder to correspond to those shown in Fig. 1. Any one of the vertical division lines drawn on the cylinder may be taken as the neutral point. The pieces may be mounted by bending the ends over and sharpening them so that they can be driven into the wood. The various strips of brass should be connected electrically, as shown by the heavy lines in Fig. 1, but these connections must all be made so that they will not extend beyond the outer surface of the strips of brass.

A small rectangular frame is made, and the cylinder is mounted in a vertical position in it by means of a rod passing down through a hole in the top of the rectangle, through the hole in the cylinder and partly through the bottom of the rectangle. The upper part of the rod may be bent so as to form a handle. The rod must be fastened to the cylinder in some convenient way.

Make six flat springs similar to the one shown at A, Fig. 2, and mount them on the inside of the rectangle so that they will correspond in their vertical positions to the strips of brass on the cylinder. Six small binding posts mounted on the outside of the box and connected to these springs serve to make the external connections, and they should be marked so that they may be easily identified.

A flat spring, ¼ in. wide, is made similar to the one shown at B, Fig. 2. Mount this spring on the inside of the rectangle so it will mesh with the ends of the nails in the small part of the cylinder. The action of this spring is to make the cylinder stop at definite positions. The top of the case should be marked so that the position of the handle will indicate the position of the cylinder. Stops should also be provided so that the cylinder case cannot be turned all the way around.

Miniature Push Buttons

A very neat and workmanlike push button may be made in the following manner: Procure an unused tan-shoe eyelet with an opening about 3/16 in. in diameter, and at the proper point drill a hole into the board in which the button is to be set. Force the eyelet in flush, using a little shellac to hold it in tightly. For the button proper, polish off and round one end of a piece of brass rod of a diameter that will move freely up and down in the eyelet. Solder a small piece of sheet brass across the lower end to keep it from coming out, then adjust and fasten on the two contact pieces, all as indicated in the sketch. The larger piece should be quite springy so as to bring the button back each time. The connections may be made by slipping the wires under the heads of the two wood screws that hold the contact pieces in place.

As every experimenter knows, it is almost impossible to drill a hole in the varnished base of an instrument without leaving a raw edge. Under such circumstances, when it is desired to make an opening for conducting cords, and the like, simply drill a hole with an ordinary drill and then set in a small shoe eyelet, which immediately presents a very finished appearance.

¶Vaseline, with a little powdered gum camphor added and heated over a slow fire, makes an excellent rust preventive for tools.

Smoker's Cabinet or Cellarette

This design, when completed, takes up a wall space 20 in. wide by 31 in. high, and extends out 14 in. The material necessary for it is as follows:

2 sides, ¾ by 14 by 31 in.
1 back, ¾ by 14 by 28⅛ in.
1 bottom, ⅞ by 14 by 20 in.
1 top, ⅞ by 10¼ by 18¾ in.
1 bottom shelf, ⅞ by 14 by 14 in.
1 top shelf, ⅞ by 10¼ by 14 in.

Door:

2 stiles, ¾ by 2 by 14½ in.
2 rails, ¾ by 2 by 10 in. (not including tenons, if such are desired).
1 panel, ⅜ by 10¾ by 11¼ in.

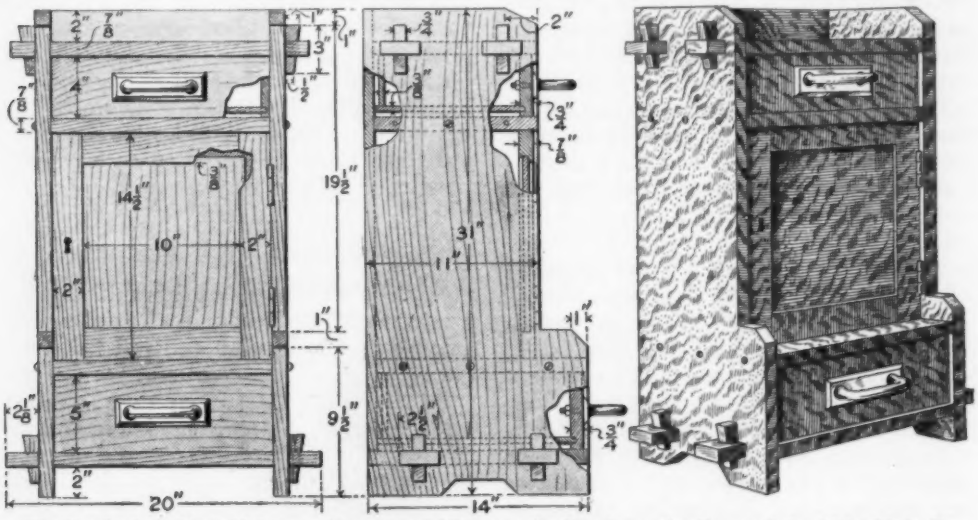
Upper drawer:

1 front, ¾ by 4 by 14 in.
1 back, ⅜ by 3¼ by 13½ in.
2 sides, ½ by 4 by 9⅞ in.
1 bottom, ⅜ by 9⅝ by 13½ in.

Lower drawer:

1 front, ¾ by 5 by 14 in.
1 back, ⅜ by 4¼ by 13½ in.
2 sides, ½ by 5 by 12⅞ in.
1 bottom, ⅜ by 12⅝ by 13½ in.
1 piece for keys, ¾ by 2¼ by 6¼ in.
1 pair hinges.
2 drawer pulls.
Screws and nails.

In constructing the cabinet, the outer frame should first be made. The sides can be laid out and cut to the desired design. The top and bottom crosspieces should then be squared up, and the tenons cut as shown, the bottom tenons extending farther, to balance the design. The top is set in ¾ in. from the back edge. Holes should be marked and cut for the ¾-in. keys, after which the four parts may be assembled, and suitable keys driven in place. The back for the cabinet is made from ¾-in. material, squared up to fit between the sides, and be flush with their top edges while resting on the bottom crosspiece.



The Smoker's Cabinet Makes an Attractive Addition to the Furniture of a Den, and should be Made Up and Finished to Match Other Pieces of the Room

It can be fastened in place with nails. The top and bottom pieces of the cabinet proper can then be made, and secured in place with round-head screws, after which the door may be made and fitted. The stiles and rails of the door should be rabbeted for a ⅜-in. square groove, to hold the panel in place. The frame can be made sufficiently strong, if properly glued and held together with dowel pins passing through the stiles into the rails. If it is desired to fasten the frame with tenons, an extra amount must be added to the length of the rails given in the stock list. The panel should not be glued in place, as the shrinkage of the wood will cause it to crack.

In making the drawers, the front should be rabbeted for a groove to fit the drawer bottom, and sidepieces can be fitted and nailed in place. These should be rabbeted for grooves, into which the bottom and end pieces fit.

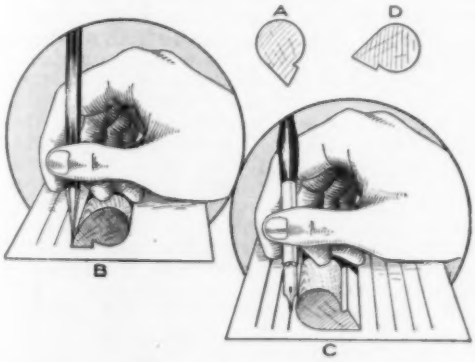
If the cabinet is finished in mission style, or fumed oak, hammered copper or brass hinges and drawer pulls will go well with the general appearance of the design.

Bench Receptacles for Small Articles

When working with small, round articles, such as ball bearings, it often happens that they roll off the bench and are lost. To remedy this, I bored several holes, each 2 in. in diameter, in a convenient place in the workbench top, making them about ⅜ in. deep, for the different articles. To make the small parts easily accessible the holes were filled in with thick paste made of plaster of Paris which was molded into a saucer shape. After the plaster became thoroughly dry the inner surface was painted over with white enamel. This made them easily cleaned with a damp cloth. Any article dropped into these depressions will roll to the center, and as the sides are curved it can be easily picked up when it is wanted.—Contributed by Frank L. Matter, Portland, Oregon.

Ruler with Round and Flat Edges

Picking up a smooth piece of ordinary wood molding, intending to use it as a ruler, I found that its shape, A, combined the properties of the round ruler and flat ruler, as well as assuming the third position D. A simple

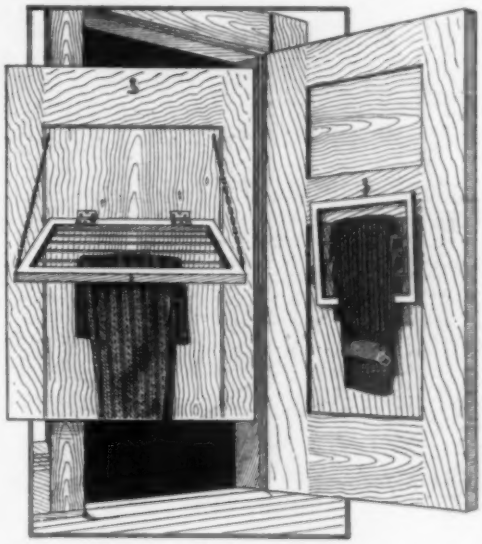


The Molding Presents a Round Edge for a Pen and a Flat One for a Pencil

reverse changes the edge from a round to a sharp or flat, accommodating it to a pen or pencil, as shown. Such a piece of molding can be procured from a local lumber dealer.—Contributed by James M. Kane, Doylestown, Pa.

A Trouser Hanger

A wood frame, similar to a picture frame, is made up and hinged to the inner side of the closet door with its outer edge hung on two chains. The



The Trousers can be Easily Hung on the Cross Bars to Keep the Crease in Them

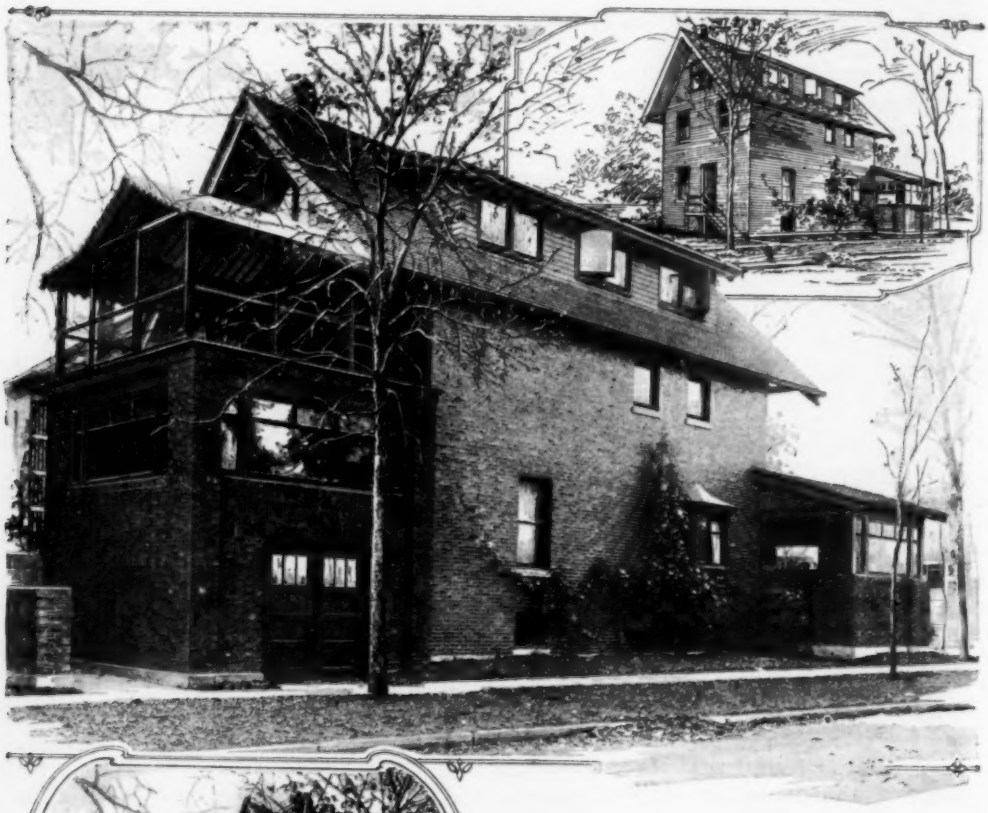
inside of the frame is fitted with cross bars. After hanging the trousers on the cross bars the frame is swung up against the door where it is held with a hook. Several pairs of trousers can be hung on the frame, and when flat against the door it takes up very little space. The trousers are kept flat so that they will hold their crease.

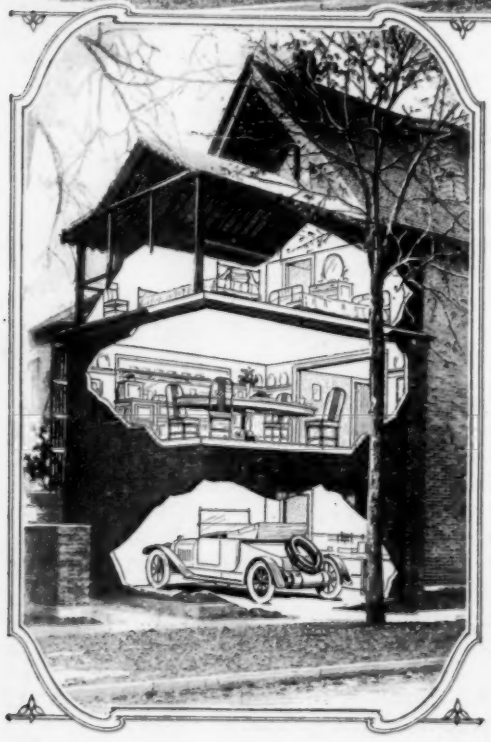
An Emergency Alcohol Stove

If a person starts on a picnic with a ketchup bottle full of wood alcohol placed in the lunch basket and suddenly discovers that the alcohol stove was left at home, it is not necessary to walk back to get it; just unscrew the cover of the ketchup bottle and bunch a piece of cloth large enough to fill the top, soak it thoroughly in the alcohol and light it. The metal top is just the right size to make a hot flame.

¶A box 8¼ in. square and 4 in. deep will hold one gallon.

ATTRACTIVE ADDITION TO BRICK RESIDENCE





AFTER a new brick residence had been in service for some months the owner discovered that the dining room was too dark to be satisfactory and that he needed both a garage and a sleeping porch. These additional facilities, as well as an adequately lighted dining room, were provided at a moderate cost by the construction of a two-story addition at the rear of the building. The garage occupies the first story and the dining room the second story. Excellent lighting is provided for the dining room by windows extending entirely across each of the three sides. The sleeping porch, which is on the roof, is screened and is roofed with canvas firmly attached to wood framing. Aside from providing the needed facilities, the construction of the addition has brought about a marked improvement in the general lines of the building.

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